

Centre Number						Candidate Number				
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For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
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7	
8	
TOTAL	



General Certificate of Secondary Education
Foundation Tier
June 2014

Additional Applied Science

AAS1FP

Unit 1 Science at Work

F

Thursday 15 May 2014 9.00 am to 10.00 am

For this paper you must have:

- a ruler
- a calculator
- the Equations Sheet (enclosed).

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.
- Question 7 should be answered in continuous prose.
In this question you will be marked on your ability to:
 - use good English
 - organise information clearly
 - use specialist vocabulary where appropriate.

Advice

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



J U N 1 4 A A S 1 F P O 1

G/TI/105163/Jun14/E3

AAS1FP

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

1 (a) A student uses a pH meter to measure the pH of some lemon juice.

Which of the following could he also use to measure the pH of the lemon juice?

Tick (✓) **one** box.

[1 mark]

a burette

a measuring cylinder

a piece of universal indicator paper

a pipette

1 (b) The student finds out that lemon juice is a weak acid.

He finds out the pH of some more chemicals.

Table 1 shows his results. Some of the results are missing.

Complete **Table 1**.

[3 marks]

Table 1

Chemical	Acid, alkali or neutral	pH number
lemon juice	weak acid	6
sulfuric acid	strong acid	
water		7
sodium hydroxide	strong alkali	14
toothpaste	weak alkali	



2 (a) A forensic scientist investigates some glass found at a crime scene.

When a ray of light passes into a glass block, the ray changes direction.

What is this effect called?

Tick (✓) **one** box.

[1 mark]

reduction

reflection

refraction

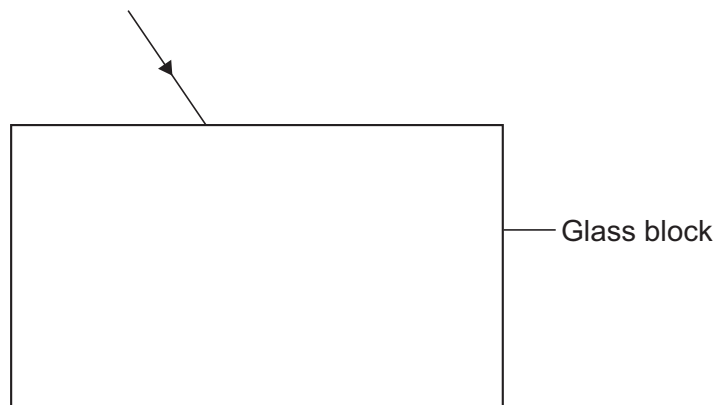
resolution

2 (b) **Figure 1** shows a ray of light going into a glass block.

On **Figure 1**, draw the path of the light ray as it passes through the glass block and out into the air.

[2 marks]

Figure 1



3 (a) Figure 2 shows two chefs working in a hotel kitchen.

Figure 2



Give **three** examples of how the food preparation area in **Figure 2** is being kept free from bacteria.

[3 marks]

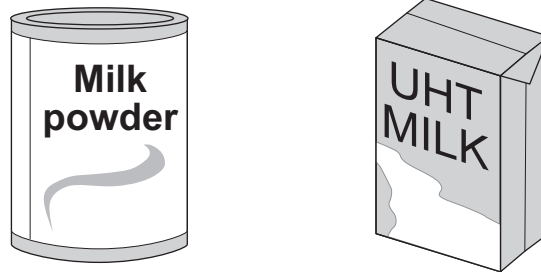
- 1
- 2
- 3



3 (b) Food can be preserved in a number of ways.

Figure 3 shows two ways in which milk can be preserved.

Figure 3



3 (b) (i) What method of food preservation is used in the milk powder?

[1 mark]

.....

3 (b) (ii) UHT milk is preserved by the process described below.

Draw a ring around the correct answer to complete each sentence.

[3 marks]

The milk is heated to a temperature of

70 °C.

100 °C.

132 °C.

The milk is kept at this temperature for

1 minute.

2 minutes.

3 minutes.

The milk is then cooled

rapidly.

slowly.

very slowly.

Question 3 continues on the next page

Turn over ►



3 (c) A student was asked to design an experiment to investigate the number of bacteria in two samples of fresh milk.

One sample of milk (**P**) was put in a refrigerator for 2 days.

Another sample of milk (**Q**) was put on a kitchen shelf for 2 days.

Figure 4 shows the equipment used to find out which sample of milk, **P** or **Q**, had more bacteria.

Figure 4



3 (c) (i) Describe how you would use this equipment to find out which sample of milk, **P** or **Q**, had more bacteria.

[4 marks]

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3 (c) (ii) **Figure 5** shows the result of the experiment for sample **P**, the milk which was put in the refrigerator.

Figure 5

Result for sample P (from the refrigerator)

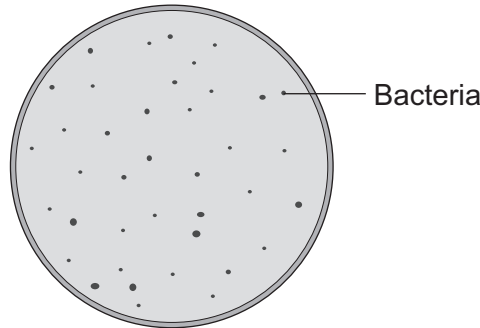
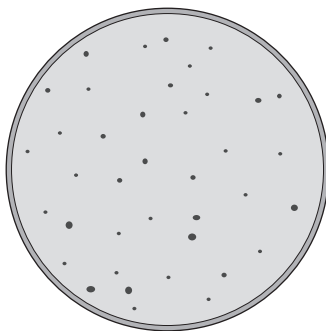


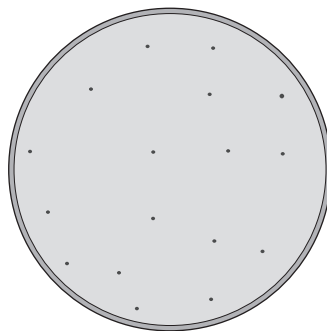
Figure 6 shows **three** possible results of the experiment for sample **Q**, the milk which was put on the shelf.

Figure 6

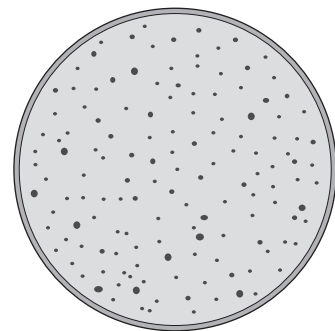
Result 1



Result 2



Result 3



Which of the results, **1**, **2** or **3**, is correct for the experiment using sample **Q**, the milk which was put on the shelf?

[2 marks]

Result

Explain your answer.

.....

.....

3 (d) Bacteria can be used to make different foods from milk.

Name **one** food that can be made from milk using bacteria.

[1 mark]

.....

Turn over ►



4 (a) A rock climber is buying a climbing rope.

One of the climbing ropes he looks at has a volume of 7200 cm^3 and a mass of 4200 g .

Calculate the density of the climbing rope.

Use the Equations Sheet to help you answer the question.

[2 marks]

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Density = g/cm^3

4 (b) The rock climber decides to buy one of three ropes, **A**, **B** or **C**.

Table 2 shows some properties of the ropes **A**, **B** and **C**. Each rope is the same length.

Table 2

Rope	Density in g/cm^3	Breaking stress in N/m^2	Cost in £
A	0.7	27 000	18
B	0.4	29 000	20
C	0.8	25 000	22

The rock climber decides to buy rope **B**.

Suggest why the rock climber chooses rope **B** instead of rope **A** or rope **C**.

[2 marks]

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4 (c) **Figure 7** shows the rock climber using his new rope during a climb.

Figure 7



The rope has a cross-sectional area of 1.20 cm^2 .

The rock climber puts a force of 720 N on the rope.

Calculate the stress in the rope.

Use the Equations Sheet to help you answer the question.

[2 marks]

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Stress = N/cm^2

6

Turn over ►



- 5 (a) Old copper coins are often covered with a layer of corrosion, as shown in **Figure 8**.

Figure 8



The corrosion contains copper carbonate.

A student uses sulfuric acid to remove copper carbonate from old copper coins.

The reaction is slow.

How can he speed up the reaction?

Tick (✓) **two** boxes.

[2 marks]

add an alkali to the acid

add more water to the acid

add sodium chloride to the acid

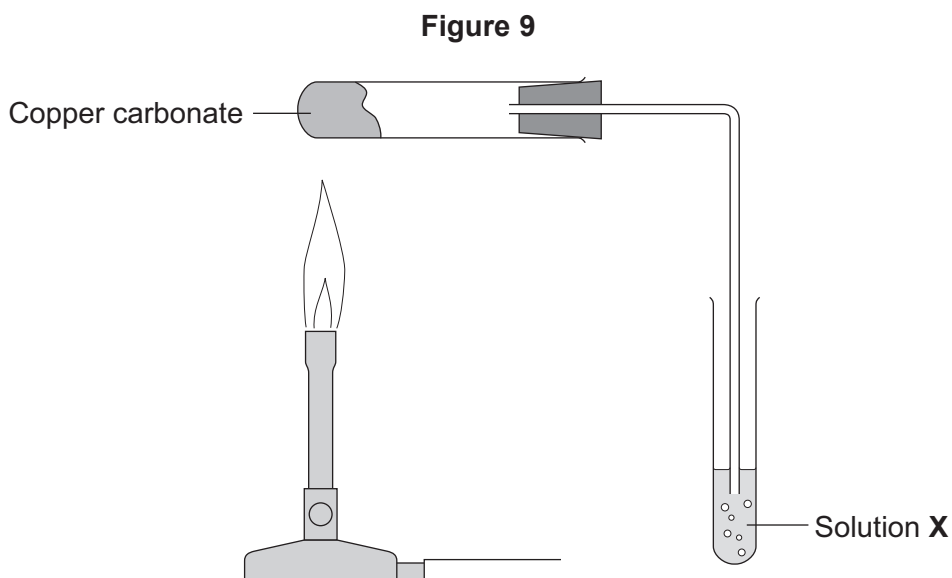
heat the acid

use a higher concentration of acid



5 (b) A different student heats copper carbonate.

Figure 9 shows the apparatus she uses.



5 (b) (i) In this reaction, the copper carbonate is changed into copper oxide and carbon dioxide.

Write the word equation for this reaction.

[1 mark]

.....

.....

5 (b) (ii) Solution X is limewater.

What happens when carbon dioxide is bubbled through limewater?

Draw a ring around the correct answer.

[1 mark]

limewater turns blue

limewater turns green

limewater turns white

Question 5 continues on the next page

Turn over ►



5 (c) One property of carbon dioxide is that it is a gas at room temperature.

What type of property is this?

Tick (✓) **one** box.

[1 mark]

biological

chemical

physical

5 (d) Draw a ring around the correct answer to complete each sentence.

[2 marks]

The chemical formula for carbon dioxide is

C₂O

CO

CO₂

The bonds in carbon dioxide are made by sharing electrons. This type of bonding

is called

covalent

ionic

metallic

bonding.

5 (e) The chemical formula for copper carbonate is CuCO₃

5 (e) (i) How many different elements are shown in the formula CuCO₃?

[1 mark]

.....

5 (e) (ii) How many atoms are shown in the formula CuCO₃?

[1 mark]

.....



6 A footballer is recovering from a leg injury.

6 (a) A health professional helps the footballer to recover by giving her some exercises to do.

What is this type of health professional called?

Tick (✓) **one** box.

[1 mark]

Pharmacist

Pharmacologist

Physiotherapist

Psychologist

6 (b) Complete the sentences by using words from the box.

[3 marks]

arteries

ligaments

muscles

organs

tendons

tissues

The bones in the human skeleton are moved by

Bones are held together by

Muscles are connected to bones by

Question 6 continues on the next page

Turn over ►



- 6 (c)** To strengthen her leg muscles, the footballer was asked to stretch a length of elastic rope, as shown in **Figure 10**.

Figure 10



The force needed to extend the elastic rope was investigated.

The results are shown in **Table 3**.

Table 3

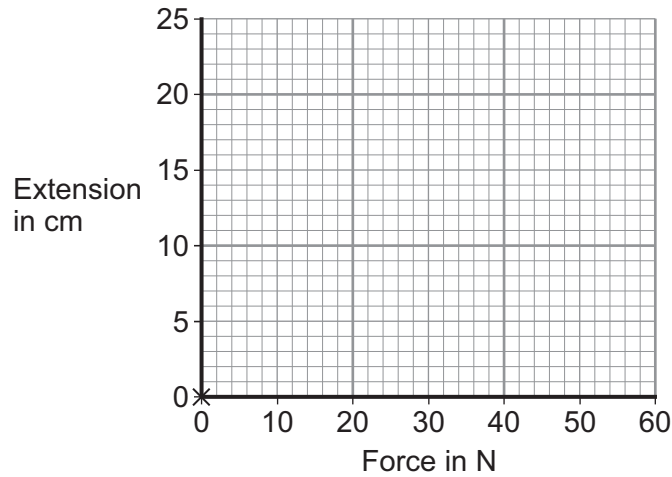
Force in N	Extension in cm
0	0
10	4
20	8
30	15
40	16
50	20



6 (c) (i) On the grid provided (**Figure 11**), plot the results. The first point has been done for you.
Draw a line of best fit.

[3 marks]

Figure 11



6 (c) (ii) Use **Figure 11** to find the force needed to extend the elastic rope by 18 cm.

[1 mark]

Force = N

6 (c) (iii) Does the elastic rope obey Hooke's Law?

Explain your answer.

[2 marks]

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10

Turn over for the next question

Turn over ►



7 In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Iron rusts when in contact with salty water.

A student suggests that increasing the amount of salt in the water would cause iron to rust more quickly.

Design an experiment to investigate whether the student is correct.

You are provided with normal laboratory apparatus, salt and a mixture of iron nails.

[6 marks]

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Turn over for the next question

Turn over ►



8 **Table 4** shows some of the characteristics of three varieties of tomato plants, **A**, **B** and **C**, and the tomatoes they produce.

Table 4

Characteristic	Tomato plant A	Tomato plant B	Tomato plant C
Average number of tomatoes per plant	25	50	35
Resistance of the plant to disease	none	none	resistant
Height of plant in m	2.5	2.0	1.5
Average diameter of tomatoes in cm	6	8	6

8 (a) (i) An agricultural scientist decides to selectively breed tomato plants **B** and **C** to produce a new variety of tomato plant with better characteristics.

Suggest **three** reasons for choosing tomato plants **B** and **C**.

[3 marks]

- 1
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- 2
-
- 3
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8 (a) (ii) Describe the process of selectively breeding tomato plants **B** and **C** to produce plants with the best characteristics.

[3 marks]

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8 (b) The agricultural scientist recommends using a herbicide. Explain how using a herbicide could increase the yield of tomatoes.

[2 marks]

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8

END OF QUESTIONS



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Figure 7: Photograph of rock climber © Getty Images
Figure 10: © Thinkstock

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