OCR
RECOGNISING ACHIEVEMENT

**F**

**A325/01**

**GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**TWENTY FIRST CENTURY SCIENCE**

**ADDITIONAL APPLIED SCIENCE A**

Scientific Detection (Foundation Tier)

**WEDNESDAY 18 JUNE 2008**

Afternoon

Time: 45 minutes

Candidates answer on the question paper.
**Additional materials (enclosed):**
None

Calculators may be used.
**Additional materials:** Pencil
Ruler (cm/mm)

*CUP/T43741*

| Candidate Forename | | Candidate Surname | |
|---|---|---|---|
| Centre Number | | Candidate Number | |

**INSTRUCTIONS TO CANDIDATES**

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- The total number of marks for this paper is **36**.

| FOR EXAMINER'S USE | | |
|---|---|---|
| **Qu.** | **Max** | **Mark** |
| **1** | **7** | |
| **2** | **5** | |
| **3** | **6** | |
| **4** | **6** | |
| **5** | **6** | |
| **6** | **6** | |
| **TOTAL** | **36** | |

This document consists of **8** printed pages.



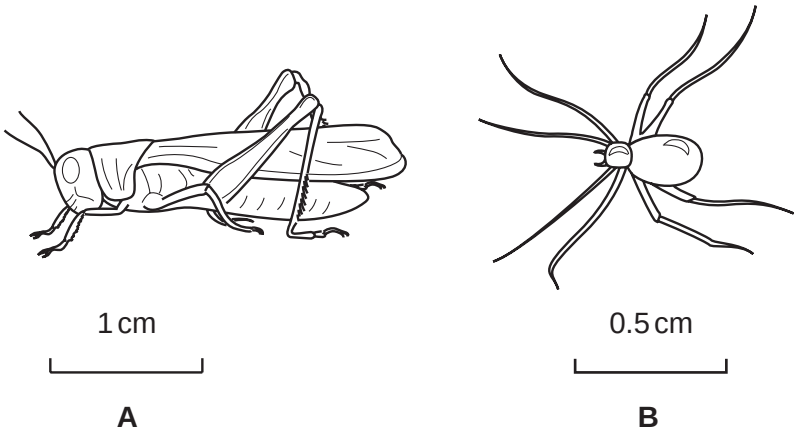
**[Turn over**

Answer **all** the questions.

**1** Jane is an environmental scientist.

She collects evidence of organisms present in a field.

She records the evidence by making sketches, **A** and **B**, of two of the organisms that she finds.




**A** **B**

**(a)** Compare sketches **A** and **B**.

Identify three important differences between the two organisms.

1 .....

.....

2 .....

.....

3 .....

..... [3]

**(b)** Use the scale on each sketch to determine the length of each organism.

**A** ……

**B** …… [2]

**(c)** Describe **two** other ways that Jane could have recorded the appearance of these two organisms.

.....

.....

..... [2]

[Total: 7]

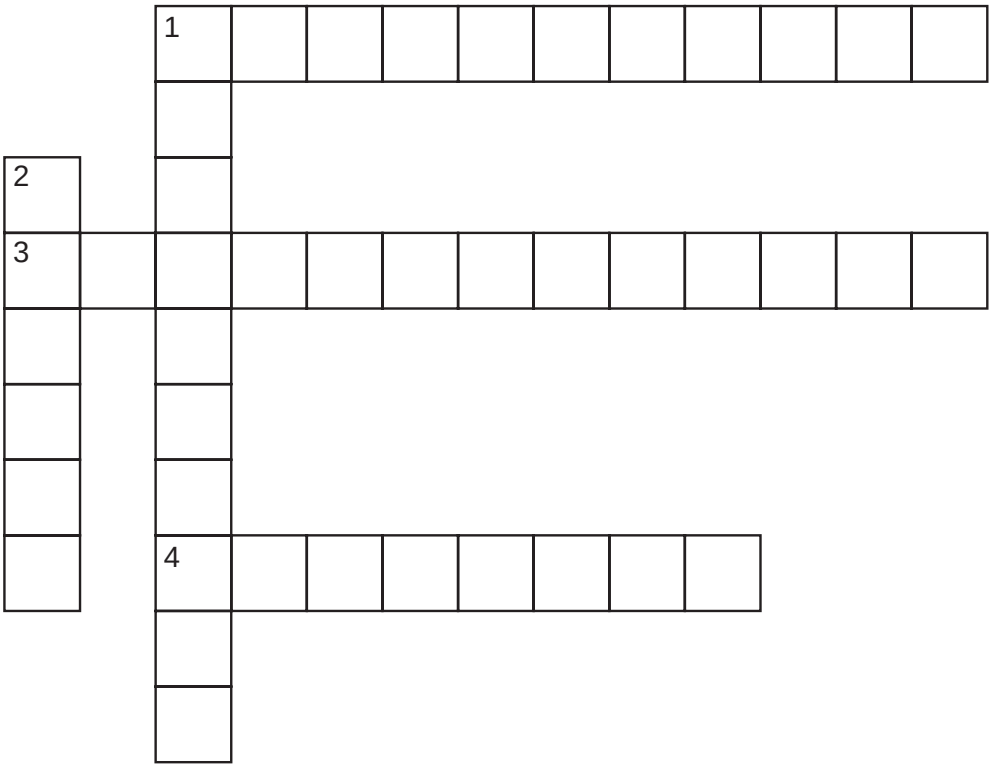
**2** Good laboratory practice is essential to produce reliable evidence.

Complete the crossword.

All the clues are about good laboratory practice.

Choose from the following list.

**accreditation**
**danger**
**enforcement**
**environmental**
**procedures**
**proficiency**
**protection**
**reliable**
**safety**




**Across**

1 A type of test used to check a laboratory.
3 What laboratories get when they pass the test.
4 Good laboratory practice produces …… evidence.

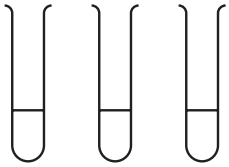
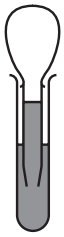
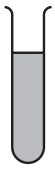
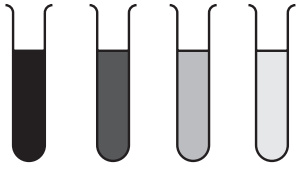
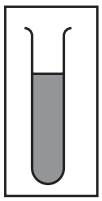
**Down**

1 Reliability is increased by using common practice and …… .
2 Complete the following phrase. 'Health and ……' [5]

[Total: 5]

**3** Freya works in a laboratory.

She uses this standard procedure to estimate the concentration of an unknown solution by colour matching.

| | |
|---|---|
| **step 1**  160 ppm | Prepare a reference solution of the coloured compound at a concentration of 160 parts per million (ppm). |
| **step 2**  | Pipette 5 $cm^3$ of distilled water into each of three test tubes. |
| **step 3**  80 ppm | Pipette 5 $cm^3$ of the reference solution into the first test tube and label it 80 ppm. |
| **step 4**  | Then, suck the liquid into and squeeze the liquid out of the pipette several times. |
| **step 5**  40 ppm | Pipette 5 $cm^3$ of the mixture in the first test tube into the second test tube. Label the second test tube 40 ppm. Repeat step 4. |
| **step 6**  20 ppm | Pipette 5 $cm^3$ of the mixture in the second test tube into the third test tube. Label the third test tube 20 ppm. Repeat step 4. |
| **step 7**  160 80 40 20  unknown | Compare the colour intensity of the unknown solution with the four prepared reference solutions. |

**(a)** Choose from the following statements to help you answer the questions.

- So there is always the same volume of liquid in each test tube.
- To mix up the solution.
- So the pipette does not contaminate all the other test tubes.
- To get a closer match.
- Because the unknown solution is unlikely to exactly match one of the reference solutions.
- So it is the same every time.

**(i)** Why did Freya produce four reference solutions, rather than just one?

.....

..... [1]

**(ii)** Why did Freya perform **step 4**?

.....

..... [1]

**(iii)** Why is this method unlikely to give Freya an exact result?

.....

..... [1]

**(iv)** Why does Freya use a standard procedure for this activity?

.....

..... [1]

**(b)** Freya then uses a colorimeter to check her results.

**(i)** Suggest why Freya does this.

Use **one** of the following words in your answer.

**accreditation** **accurate** **chromatography** **microscope**

.....

..... [1]

**(ii)** Which of the following words best describes the results obtained by using a colorimeter?

Choose from the following list.

Put a (ring) around the best answer.

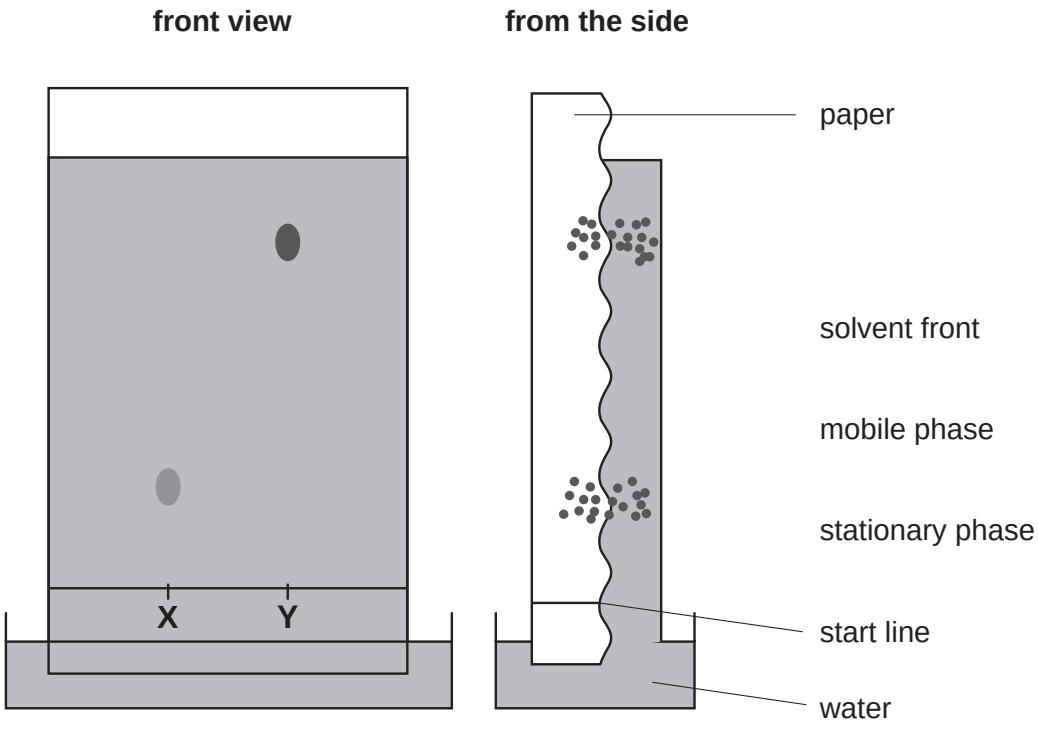
**qualitative** **quantitative** **semi-quantitative**

[1]

[Total: 6]

**4** Neil uses chromatography to analyse an unknown solution **X**.

Look at the diagram of Neil's chromatogram.




**(a)** Label the side-view of Neil's chromatogram.

Use the words next to the diagram. [3]

**(b)** Draw an arrow on Neil's side-view diagram to show the movement of substances between the mobile phase and the stationary phase. [1]

**(c)** Neil uses **Y** as a standard reference solution.

What conclusion can Neil make about **X** and **Y**?

Explain your answer.

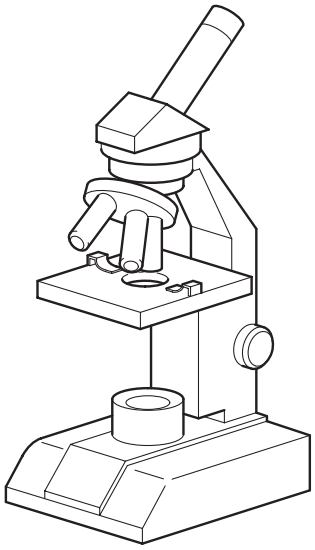
.....

.....

..... [2]

[Total: 6]

**5** Scientists sometimes use light microscopes when collecting evidence.



**(a)** Label the picture of the microscope.

Use the following labels.

**eyepiece** **focusing knob** **lamp** **objective lens** **stage** [3]

**(b)** Draw a straight line from each **part** of the microscope to the best explanation of what **job** it does.

| part | job |
|---|---|
| eyepiece | the part you look through |
| focusing knob | adjusts the image to make it sharp |
| lamp | stops the slide moving |
| objective lens | supports the slide |
| stage | selected to change the magnification |
| | lights up the specimen |

[3]

[Total: 6]

**6** Ralf uses different techniques to separate samples of substances.

**(a)** Draw a straight line from each **method** that Ralf uses to its best **description**.

| method | description |
|---|---|
| paper chromatography | the sample is heated to turn it into a vapour |
| electrophoresis | measures the intensity of the colour of the sample |
| gas chromatography | can be used on small biological samples including DNA fragments |
| | uses a liquid solvent to separate the sample |

[3]

**(b)** Ralf separates fragments of DNA for the Forensic Science Service.

This process is called DNA profiling.

Explain **two** different ways that DNA profiling can be used.

.....

.....

.....

.....

.....

..... [3]

[Total: 6]

**END OF QUESTION PAPER**