Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

CO-ORDINATED SCIENCES **0654/52**

Paper 5 Practical Test **May/June 2018**

2 hours

Candidates answer on the Question Paper.

Additional Materials: As listed in the Confidential Instructions.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
You may lose marks if you do not show your working or if you do not use appropriate units.
Notes for Use in Qualitative Analysis for this paper are printed on page 12.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
Total	

This document consists of **11** printed pages and **1** blank page.

DC (SC/JG) 150102/2

1 You are provided with a piece of banana, hot and cold water, iodine solution, Benedict's solution and biuret solution.

- Cut a slice of about 5 mm from one end of the banana.
- Place it on the white tile with the cut surface uppermost.

(a) **(i)** In the box shown, make a detailed and enlarged pencil drawing of the slice of banana.

[2]

(ii) Measure the diameter of the slice of banana, in millimetres, to the nearest millimetre.

diameter = ... mm

Measure the equivalent diameter of your drawing of the banana, in millimetres, to the nearest millimetre.

diameter = ... mm
[3]

(iii) Use your **two** measurements to calculate the magnification of your drawing.

Show your working.

magnification = ... [1]

(b) Add a few drops of iodine solution to the slice of banana on the white tile.

Record **and** explain your observations.

observations ....

explanation ....

.... [2]

(c) Cut a fresh slice of banana of approximately 10 mm in length and chop it into small pieces.

Divide the pieces equally between two test-tubes and add about 1 cm depth of cold water to each test-tube.

Carry out a test on the chopped banana in one of the test-tubes using the Benedict's solution.

You need to add Benedict's solution to at least the same depth as the banana and use the hot water provided as a water-bath.

(i) Record **and** explain your observations.

observations ....

explanation ....

.... [2]

(ii) State **and** explain **one** safety precaution you have taken in this test.

....

.... [1]

(d) To the chopped banana in the other test-tube, add biuret solution to approximately the same depth as the banana.

Record **and** explain your observations.

observations ....

explanation ....

.... [2]

(e) A student tests some banana for the presence of fat.

He uses the following method.

1. Place some chopped banana into a test-tube.
2. Add 2 cm^3 of water and stir.
3. Pour off the water into another test-tube containing 2 cm^3 of ethanol.

(i) Identify the error in the student's method.

....

.... [1]

(ii) State the observation for a positive result from a correct fat test.

.... [1]

Please turn over for Question 2.

2 Notes for use in Qualitative Analysis for this question are printed on page 12.

You are going to investigate the reactions of metal oxide **H**.

(a) Heat the **smaller** test-tube containing solid **H**.

Continue heating in the hottest part of a blue flame for at least 2 minutes.

Record the colour of solid **H** after heating.

.... [1]

(b)
- To the sample of solid **H** in the **larger** test-tube, add about 10 cm^3 of the unknown acid labelled **acid**.
- **Carefully** heat the test-tube above the flame until the mixture boils, then stop heating.
- Leave to cool for approximately 1 minute.
- Filter the mixture.

(i) Record the colours of the filtrate and residue.

filtrate ....

residue ....

[2]

(ii) Place approximately 1 cm depth of the liquid filtrate into a clean test-tube.

Add sodium hydroxide solution slowly until there is no further change.

Record your observations.

....

.... [1]

(iii) Place approximately 1 cm depth of the liquid filtrate into another clean test-tube.

Add one spatula load of magnesium powder.

Stir the contents of the test-tube.

Feel the test-tube and observe the contents of the test-tube.

Record your observations.

....

....

....

....

.... [4]

(iv) Place approximately 1 cm depth of the liquid filtrate into another clean test-tube.

Add the same depth of potassium iodide solution, stir and allow to settle.

If the mixture does not separate then you will need to filter it.

Record your observations.

....

....

.... [2]

(c) (i) Using your observations in **(a)** and **(b)**, identify the metal in the metal oxide **H**.

State **two** pieces of evidence you have used to make this identification.

metal is ....

first piece of evidence ....

....

second piece of evidence ....

....
[3]

(ii) The acid used in **(b)** is either hydrochloric acid or sulfuric acid.

Describe a test to identify the acid used in **(b)**.

You should include the expected observations for the acids.

Do **NOT** carry out this test.

test ....

....

observation for hydrochloric acid ....

....

observation for sulfuric acid ....

....
[2]

3 You are going to measure the approximate mass of a metre rule using a balancing method.

You are provided with a 200 g load labelled **P**, a 100 g load labelled **Q**, a metre rule and a pivot.

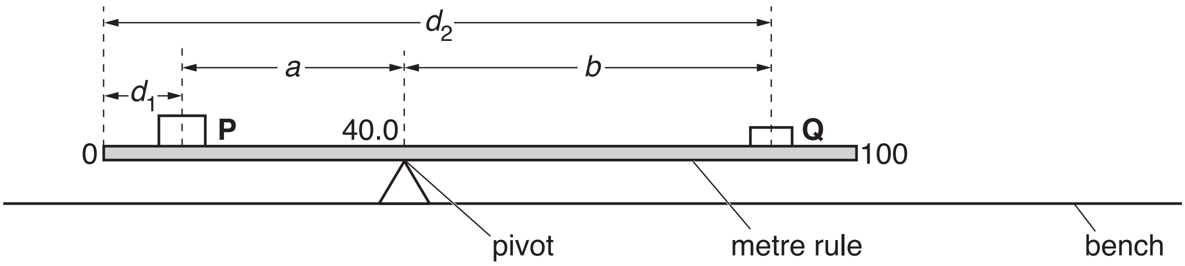

Fig. 3.1

(a) (i)
- Set up the apparatus as shown in Fig. 3.1.
- Place the pivot under the 40.0 cm mark. **The position of the pivot must not change during this experiment.**
- Place the load **P** on the rule so that its centre is at a distance d_1 = 10.0 cm from the zero end of the rule, as shown in Fig. 3.1.
- Adjust the position of the load **Q** so that the rule is as close as possible to being balanced.
- Record, in Table 3.1, the distance d_2 to the nearest 0.1 cm from the **zero** end of the rule to the centre of load **Q**. [1]

Table 3.1

d_1 / cm	d_2 / cm	$a = (40 - d_1)$ / cm	$b = (d_2 - 40)$ / cm
10.0			
15.0			
20.0			
25.0			
30.0			

(ii) Describe how you ensured that the centre of load **P** was directly above the 10.0 cm mark on the rule.

....

.... [1]

(iii) Repeat the procedure in **(a)(i)** for values of d_1 = 15.0 cm, 20.0 cm, 25.0 cm and 30.0 cm. [2]

(b) For each value of d_1 and d_2, calculate the distances *a* and *b*. Use the equations shown.

$$a = (40 - d_1)$$

$$b = (d_2 - 40)$$

Record, in Table 3.1, your values of *a* and *b*. [1]

(c) **(i)** On the grid provided, plot a graph of *a* (vertical axis) against *b*.

Start your axes from the origin (0, 0).

[3]

(ii) Draw the best-fit straight line. [1]

(iii) Calculate the gradient G of your line.

Show all working and indicate on your graph the values you chose to enable the gradient to be calculated.

G = ... [2]

(iv) Write down the value of the intercept I on the vertical axis.

I = ... [1]

(d) The mass *m* in grams of the metre rule is given by the equation shown.

$$m = \frac{10 \times I}{G}$$

Use this equation to calculate a value for *m*. Give your answer to an appropriate number of significant figures.

m = ... g [1]

(e) Suggest **two practical** reasons why, despite carrying out the experiment with care, your value for the mass of the rule is only approximate.

1 ....

....

2 ....

....
[2]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Tests for anions

anion	*test*	*test result*
carbonate (CO_3^{2-})	add dilute acid	effervescence, carbon dioxide produced
chloride (Cl^-) [in solution]	acidify with dilute nitric acid, then add aqueous silver nitrate	white ppt.
nitrate (NO_3^-) [in solution]	add aqueous sodium hydroxide, then aluminium foil; warm carefully	ammonia produced
sulfate (SO_4^{2-}) [in solution]	acidify with dilute nitric acid, then add aqueous barium nitrate	white ppt.

Tests for aqueous cations

cation	*effect of aqueous sodium hydroxide*	*effect of aqueous ammonia*
ammonium (NH_4^+)	ammonia produced on warming	–
copper(II) (Cu^{2+})	light blue ppt., insoluble in excess	light blue ppt., soluble in excess, giving a dark blue solution
iron(II) (Fe^{2+})	green ppt., insoluble in excess	green ppt., insoluble in excess
iron(III) (Fe^{3+})	red-brown ppt., insoluble in excess	red-brown ppt., insoluble in excess
zinc (Zn^{2+})	white ppt., soluble in excess, giving a colourless solution	white ppt., soluble in excess, giving a colourless solution

Tests for gases

gas	*test and test result*
ammonia (NH_3)	turns damp red litmus paper blue
carbon dioxide (CO_2)	turns limewater milky
chlorine (Cl_2)	bleaches damp litmus paper
hydrogen (H_2)	'pops' with a lighted splint
oxygen (O_2)	relights a glowing splint