Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

COMBINED SCIENCE **0653/51**

Paper 5 Practical Test **May/June 2017**

1 hour 30 minutes

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 8.

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 **8** printed pages.

CAMBRIDGE International Examinations

1 You are going to investigate the nutrient content of banana, chickpea and egg white.

(a)
- Label three test-tubes **A**, **B** and **C**.
- Chop up the banana and place in the small beaker. Mash with a little distilled water until it can be poured.
- Divide the mixture between the three test-tubes.
- Carry out Benedict's test with test-tube **A**.
- Carry out the biuret test with test-tube **B**.
- Carry out the iodine test with test-tube **C**.

State in which of these tests a source of heat is required.

.....[1]

(b) **(i)** Complete the third row of Table 1.1 to show your observations.

(ii) Rinse out the test-tubes **A**, **B** and **C** with distilled water or label three clean test-tubes **A**, **B** and **C**.

Add chickpea to a depth of approximately 2 cm to test-tubes **A**, **B** and **C**.

Repeat the tests and complete the fourth row of Table 1.1 to show your observations.

(iii) Rinse out the test-tubes **A**, **B** and **C** with distilled water or label three clean test-tubes **A**, **B** and **C**.

Add egg white to a depth of approximately 2 cm to test-tubes **A**, **B** and **C**.

Repeat the tests and complete the fifth row of Table 1.1 to show your observations.

Table 1.1

	Benedict's test	biuret test	iodine test
nutrient tested for	reducing sugar	protein	starch
banana			
chickpea			
egg white			

[3]

(c) Use your observations in **(b)** to state the nutrient content of the foods you tested.

(i) Banana contains ..... [1]

(ii) Chickpea contains ..... [1]

(iii) Egg white contains ..... [1]

(d) Describe how you can test for the presence of fat in egg white.

method .....

.....

.....

observation for positive result .....

.....

[3]

2 Notes for use in Qualitative Analysis for this question are printed on page 8.

Solution **H** and solution **J** are each one of the following solutions:

list of possible solutions

ammonia solution
sodium hydroxide solution
hydrochloric acid
sulfuric acid
barium nitrate solution
silver nitrate solution

(a) (i) Test solution **H** with both red and blue litmus papers.

Record your observations in Table 2.1.

Test solution **J** with both red and blue litmus papers.

Record your observations in Table 2.1.

Table 2.1

	solution **H**	solution **J**
red litmus paper		
blue litmus paper		

[2]

(ii) Using the observations in Table 2.1, choose from the list of possible solutions the two possible identities for each of solutions **H** and **J**.

solution **H** could be ..... or

.....

solution **J** could be ..... or

.....

[2]

(b) (i)
- Place solution **H** in a test-tube to a depth of 2 cm.
- Slowly add the copper sulfate solution until the test-tube is almost full.
- Record your observations in Table 2.2.
- Filter the mixture and record in Table 2.2 the colour of any residue.

Repeat this procedure with solution **J**.

Table 2.2

	solution **H**	solution **J**
observations on slowly adding copper sulfate solution		
colour of any residue		

[3]

(ii) Use **(a)(ii)** and your observations in Table 2.2 to identify solution **H** and **J**.

solution **H** is .....

solution **J** is .....

[2]

(c) Suggest one reason why iron(III) sulfate solution cannot be used in **(b)(i)** instead of copper sulfate solution to identify solution **J**.

.....

.....[1]

3 You are going to investigate how the resistance of a metal wire depends upon its length.

The circuit shown in Fig. 3.1 has been set up for you.

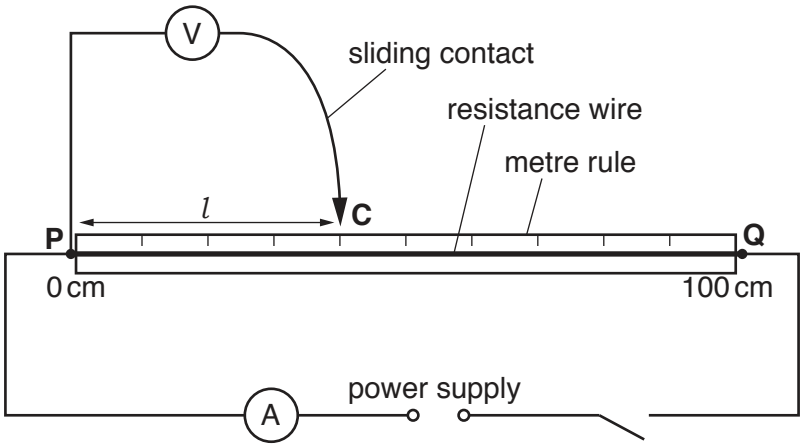


Fig. 3.1

(a) (i)
- Connect the crocodile clip **C** to the resistance wire **PQ** at a length l = 20.0 cm from end **P**.
- Close the switch.
- Record in Table 3.1 the current I flowing through the wire and the potential difference V.
- Switch off the circuit. [1]

Table 3.1

length l/cm	current I/A	potential difference V/V	resistance R/Ω
20.0			
35.0			
50.0			
65.0			
80.0			
95.0			

(ii) Repeat the steps in **(a)(i)** for values of l = 35.0 cm, 50.0 cm, 65.0 cm, 80.0 cm and 95.0 cm. [3]

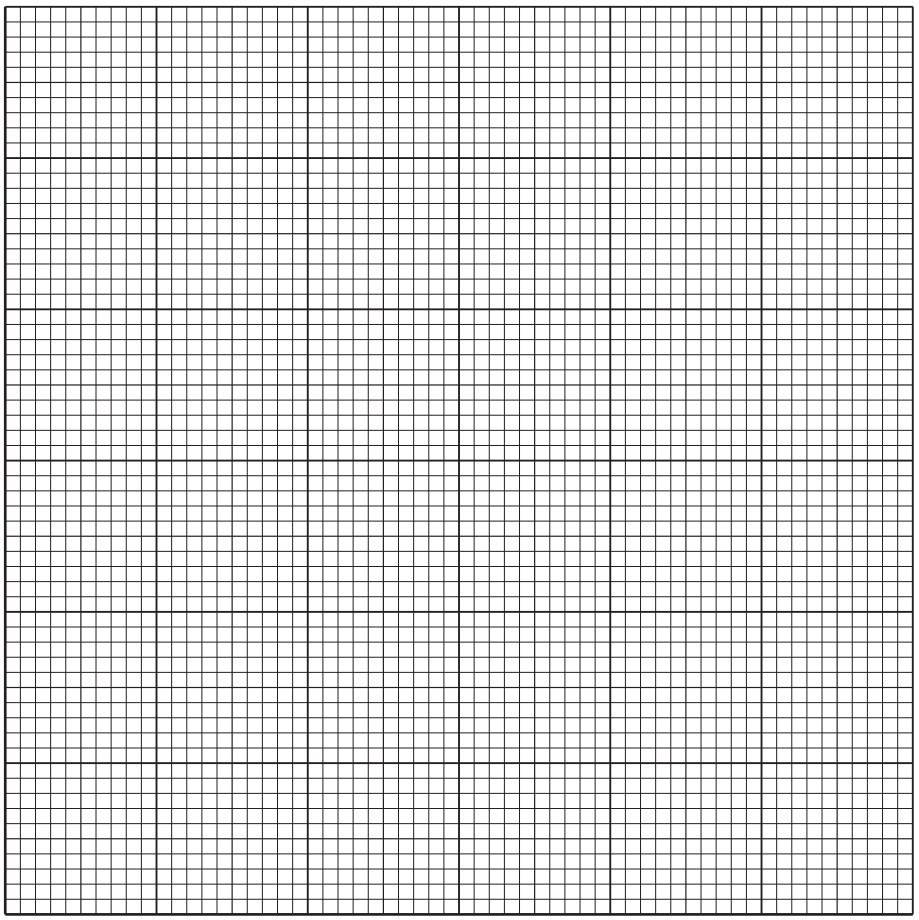
(iii) Calculate the resistance R for each length of wire, using the equation

$$R = \frac{V}{I}.$$

Record, in Table 3.1, your values of R. [1]

(b) Use the results in Table 3.1 to plot a graph of R(vertical axis) against l.

Start both axes of your graph at the origin (0, 0). Draw the best-fit straight line. [3]



(c) **(i)** Extend your line to predict the value of R at length l = 110.0 cm.

R = ...Ω [1]

(ii) Suggest the relationship between the length of the wire and its resistance.

relationship .....

.....[1]

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