Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME	

CENTRE NUMBER						CANDIDATE NUMBER					

0154921585

COMBINED SCIENCE **0653/52**

Paper 5 Practical Test **February/March 2020**

1 hour 15 minutes

You must answer on the question paper.

You will need: The materials and apparatus listed in the confidential instructions

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.

INFORMATION

- The total mark for this paper is 40.
- The number of marks for each question or part question is shown in brackets [ ].
- Notes for use in qualitative analysis are provided in the question paper.

For Examiner's Use	
1	
2	
3	
4	
Total	

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[Turn over

1 **(a)** You are going to investigate different types of bean.

You are provided with two different types of bean, **A** and **B**. You have been given three beans of each type.

(i) Measure the **longest** length of each bean and record your measurements in Table 1.1.

Table 1.1

bean number	bean **A** length /	bean **B** length / ....
1		
2		
3		

[2]

(ii) Complete the headings of Table 1.1 by adding the units. [1]

(iii) Calculate the average length of each type of bean. Give your answers to an appropriate number of significant figures.

average length of type **A** ....

average length of type **B** ....

[1]

(iv) Plot a bar chart of the average length of the **two** types of bean.

[2]

(v) Identify **one** possible source of error when measuring the longest length of each bean.

....

.... [1]

(vi) Suggest a different measurement you could take for comparing the size of the beans.

.... [1]

(vii) Apart from size, state **one** other visible difference between the types of beans provided.

.... [1]

(b) Remove the outer layer of one of the type **A** beans and crush the bean carefully on a white tile.

Add five drops of iodine solution to the crushed bean.

(i) Record your observations:

colour of iodine solution **before** adding to crushed bean ....

colour of iodine solution **after** adding to crushed bean ....

[1]

(ii) State a conclusion for this test.

....

.... [1]

(iii) Describe how you would test a bean for the presence of reducing sugars.

....

....

.... [2]

[Total: 13]

2 You are going to investigate the reactivity of four metals **G**, **H**, **J** and **L**.

(a) Procedure
Read the whole of procedure **2(a)** before you begin the investigation.

- Label one well on the spotting tile **G**, a second **H**, a third **J** and a fourth **L**. Put the label next to the well.
- Half fill each of the four labelled wells with aqueous copper sulfate.
- Record the colour of each of the metals in Table 2.1.
- Put a small amount of metal **G** into well **G**.
- Put a small amount of metal **H** into well **H**.
- Put a small amount of metal **J** into well **J**.
- Put a small amount of metal **L** into well **L**.

Leave this experiment until **after** you have completed part **2(b)**.

After you have completed **2(b)** look at each well in the spotting tile.

(i) Record these final observations in Table 2.1.

Table 2.1

metal	colour of aqueous copper sulfate before the metal is added	colour of metal	final observation
G	blue		
H	blue		
J	blue		
L	blue		

[3]

(ii) State which of the metals have reacted with aqueous copper sulfate.
Explain your answer.

metal ....

explanation ....

....
[1]

(b) (i) Procedure

Read the whole of procedure **2(b)(i)** before you begin.

- Place about 2 cm depth of dilute sulfuric acid into a boiling tube.
- Measure the initial temperature of the sulfuric acid in the boiling tube.
- Record in Table 2.2 this initial temperature to the nearest 0.5 °C against metal **G**.
- Add the rest of the sample of metal **G** to the boiling tube.
- Stir and record in Table 2.2 your observations of the mixture in the boiling tube.
- Measure the temperature in the boiling tube after 2 minutes.
- Record in Table 2.2 this temperature to the nearest 0.5 °C.

Repeat the procedure in **2(b)(i)** for metals **H**, **J** and **L**. Use a clean boiling tube for each reaction.

Table 2.2

metal	initial temperature of acid / °C	temperature after 2 minutes / °C	observations
G			
H			
J			
L			

[4]

(ii) Use the results in Table 2.2 to suggest which **one** of the four metals **G**, **H**, **J** and **L**, is the most reactive.

.... [1]

(iii) State **two different** reasons for your choice in **2(b)(ii)**.

reason 1 ....

....

reason 2 ....

....

[2]

(iv) Suggest how the experiment in **2(b)(i)** could be changed to make the comparison of reactivity of the metals more reliable.

Do **not** include repeating the experiment.

....

.... [1]

Go back and complete parts 2(a)(i) and 2(a)(ii).

(c) Place the metals in order of reactivity, starting with the most reactive.

Use the results and observations in Table 2.1 and Table 2.2 to help you.

metal .... most reactive

metal ....

metal ....

metal .... least reactive

[1]

[Total: 13]

3 You are going to determine the period T of a pendulum.

(a) The apparatus shown in Fig. 3.1 has been set up for you.

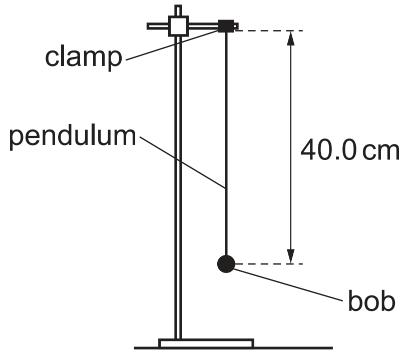

Fig. 3.1

The period T is the time it takes for the pendulum to complete one full oscillation (from S to P, P to Q and then from Q back to S), as shown in Fig. 3.2.

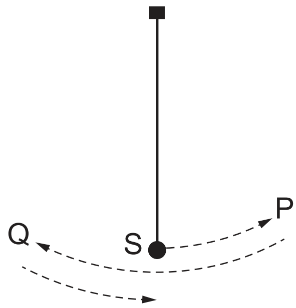

Fig. 3.2

(i) Pull the pendulum a few centimetres to one side and release it. Observe the oscillations.

Explain why it will be difficult to time one oscillation accurately using the stop-watch.

....

.... [1]

(ii) Timing a larger number of oscillations n, allows you to calculate the period T using the equation shown.

$$T = \frac{\text{time for } n \text{ oscillations}}{n}$$

Suggest a suitable number for n.
Give a reason for the number you have chosen.

n = ...

reason ....

....
[2]

(iii) Complete the heading in Table 3.1 with the number of oscillations *n* chosen in **3(a)(ii)**.
Measure the time for *n* oscillations.
Record in Table 3.1 the time for *n* oscillations to the nearest 0.01 s. [1]

Table 3.1

time for ..... oscillations / s	period *T* / s

(iv) Measure the time for *n* oscillations **two more** times.
Record each time in Table 3.1 to the nearest 0.01 s. [1]

(b) (i) Calculate and record in Table 3.1 the period *T* of the pendulum for each of your results.
Use the equation in **3(a)(ii)**. Give your answers to the nearest 0.01 s.

[1]

(ii) Calculate the average value of *T* from your three experiments.

average *T* = ... s
[1]

[Total: 7]

4 Fig. 4.1 shows a beam that is balanced by placing masses on opposite sides of a central pivot.

A has a mass of 50 g and is placed a fixed distance from the pivot. The mass of **B** can be changed. **B** can also be moved to different positions on the beam.

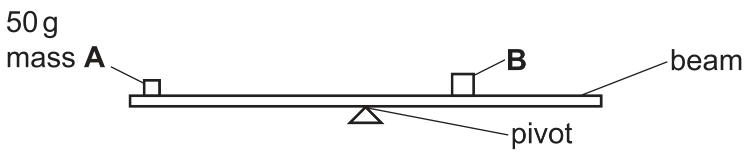

Fig. 4.1

Mass **B** is heavier than mass **A**. It must be placed closer to the pivot than **A** for the beam to balance.

Plan an investigation to find out how the distance of mass **B** from the pivot, when the beam is balanced, depends on its mass.

You are provided with:

- a metre rule which can act as the beam
- a pivot
- 50 g mass **A**
- a selection of 10 g and 100 g masses which can be combined to make different values for mass **B**.

You may use any other common laboratory apparatus in your plan.

You are not required to do this investigation.

In your plan, include:

- a brief description of the method
- how you will ensure that your results are as accurate as possible
- the values of mass that you will use for mass **B**
- the column headings (including any appropriate units) for the table you will use to record your results
- how you will process your results to draw a conclusion.

....

....

....

....

....

....

....

....

....

....

....

....

....

.... [7]

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, 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	–
calcium (Ca^{2+})	white ppt., insoluble in excess	no ppt. or very slight white ppt.
copper (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