Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	

6048873657

PHYSICAL SCIENCE **0652/52**

Paper 5 Practical Test **October/November 2018**

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 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	
Total	

This document consists of **9** printed pages and **3** blank pages.

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

You are given four colourless aqueous solutions **H**, **J**, **K** and **L**.

Each solution is one of the following but it is not known which solution is which.

aqueous barium chloride
dilute hydrochloric acid
aqueous sodium hydroxide
aqueous zinc sulfate

You are going to test the solutions to identify them.

(a) **(i)**
- Place 1 cm depth of solution **J** in a test-tube and slowly add solution **H** until it is in excess.
- Place a bung in the test-tube and invert the test-tube to mix the contents.

Record your observations in Table 1.1. [2]

Table 1.1

1 cm depth of solution	solution added slowly in excess	observations
J	**H**	
K	**H**	
L	**H**	
K	**J**	
L	**J**	
L	**K**	

(ii) • Repeat **(a)(i)** for the next five pairs of solutions shown in Table 1.1.

• Wash the bung between tests.

If you need to clean your test-tubes, rinse them out with plenty of water. [2]

(b) **(i)** Use your observations in Table 1.1 to identify which **pair** of solutions is sodium hydroxide and zinc sulfate.

.... and .... [1]

(ii) Use your observations in Table 1.1 to identify which **pair** of solutions is barium chloride and zinc sulfate.

.... and .... [1]

(iii) Use your answers in **(b)(i)** and **(b)(ii)** to identify the four solutions.

H is ....

J is ....

K is ....

L is ....
[1]

(c) A student suggests that if silver nitrate solution and copper sulfate solution are added separately to each of **H**, **J**, **K** and **L**, the observations will confirm the identities of **H**, **J**, **K** and **L**.

(i) • Test **H**, **J**, **K** and **L** with silver nitrate and copper sulfate solution separately.

Record your observations in Table 1.2.

Wash any test-tubes that you reuse with distilled water before they are reused. [5]

Table 1.2

solution	observation when silver nitrate added	observation when copper sulfate added
H		
J		
K		
L		

(ii) Explain how the observations in Table 1.2 confirm the identities of **H**, **J**, **K** and **L**.

....

....

....

....

....

....[3]

2 You are going to measure the length l of a spring when different loads L are added to it. You will then use the spring to measure the density of a stone.

A spring has been set up in a clamp for you, as shown in Fig. 2.1.

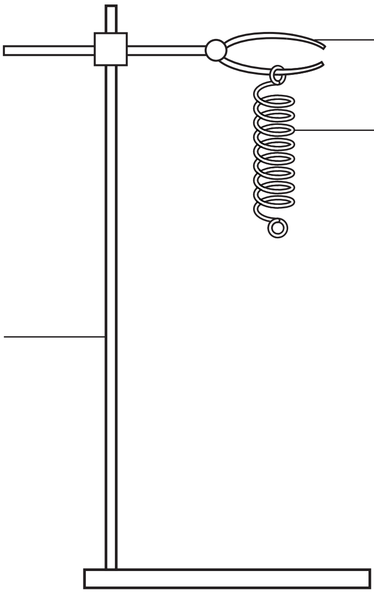

Fig. 2.1

(a) **(i)** Measure and record to the nearest 0.1 centimetre, the length l_0 of the unstretched spring.

l_0 = ... cm [1]

(ii) Use a ruler to mark **on Fig. 2.1** the length l_0 you measured. [1]

(iii)
- Hang a load L of 1.0 N on the spring.
- Measure the new length l of the spring to the nearest 0.1 centimetre.

Record the length l in Table 2.1 on page 6. [1]

(iv) Repeat step **(iii)** using loads of 2.0 N, 3.0 N, 4.0 N and 5.0 N and complete Table 2.1. [2]

Table 2.1

load L / N	spring length l / cm
1.0	
2.0	
3.0	
4.0	
5.0	

(b) State how you ensure that the length l of the spring is measured as accurately as possible.

....

....[1]

(c) **(i)** On the grid provided in Fig. 2.2 on page 7, plot a graph of spring length l (vertical axis) against load L. Start both axes from the origin (0,0). [2]

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

(iii) Use your graph to determine the unstretched length l_0 of the spring.

l_0 = ... cm [1]

(d) State how your value determined in **(c)(iii)** compares with your measured value in **(a)(i)**.

Suggest a reason for any difference or similarity.

....

....[1]

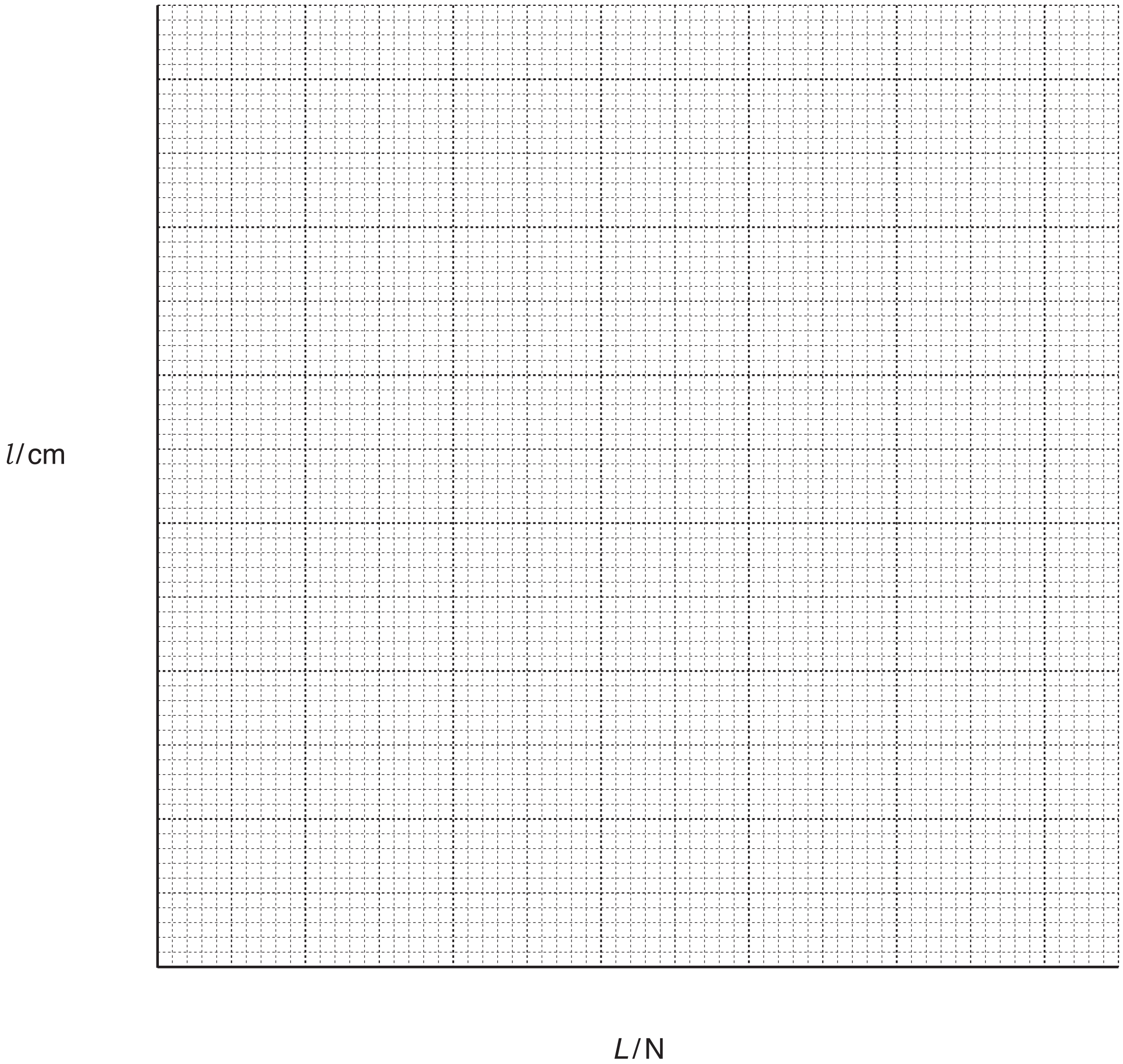

Fig. 2.2

(e)
- Remove the mass from the spring.
- Attach the stone provided to the spring.

(i) Measure and record the length l_A of the spring.

length l_A of spring = ... cm [1]

(ii) Use your answer to **(e)(i)** and the graph in Fig. 2.2 to determine the weight of the stone.

Show on the graph how you obtained your answer.

weight of stone = ... N [1]

(f) • Place the beaker of water under the stone.

• Slowly lower the clamp until the stone is completely immersed in the water, as shown in Fig. 2.3.

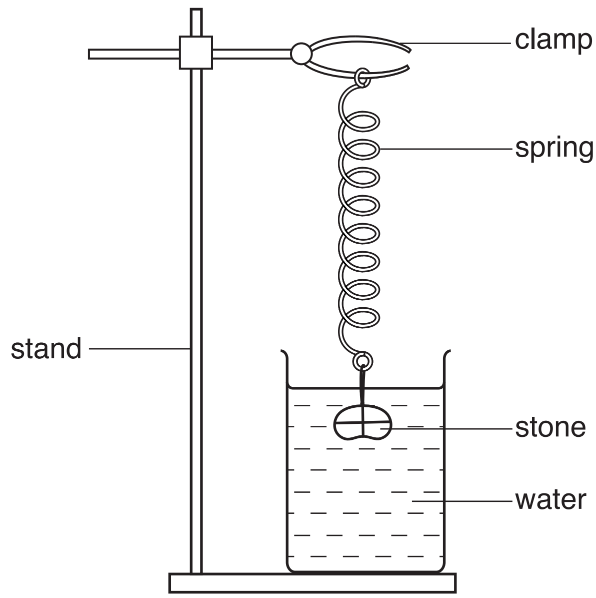

Fig. 2.3

(i) Measure and record the length l_W of the spring.

length l_W of spring = ... cm [1]

(ii) Calculate the density ρ of the stone using your answers to **(a)(i)**, **(e)(i)** and **(f)(i)**. Use the equation shown.

$$\rho = \frac{(l_A - l_0)}{(l_A - l_W)}$$

density of stone ρ = ... g / cm^3 [1]

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NOTES FOR USE IN QUALITATIVE ANALYSIS

Test 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.

Test 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

Test 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