EXAMINATIONS COUNCIL OF ESWATINI
Eswatini General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

PHYSICAL SCIENCE **6888/04**

Paper 4 Alternative to Practical **October/November 2019**

1 hour

Candidates answer on the Question Paper.

Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on the spaces provided.
Write in dark blue or black pen.
You may use a HB pencil for any diagrams, graphs, tables or rough workings.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.
Do **not** write on the barcode.

Answer **all** questions.
You may use an electronic calculator.

You may lose marks if you do not show your working or if you do not use the appropriate units.
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 A student is provided with a copper foil, magnesium ribbon and iron nails.

(a) Describe the physical appearance of copper and magnesium metals.

magnesium .....

copper ..... [2]

(b) The student carries out an experiment to determine the order of reactivity of magnesium, copper and iron.

(i) She adds about 5 cm^3 of copper(II) sulfate solution into two test-tubes.

She adds magnesium ribbon into one test-tube and an iron nail into the other test-tube.

She allows the test-tubes to stand for about three minutes.

State the observations she makes in each test-tube.

magnesium .....

iron nail ..... [2]

(ii) She confirms the order of reactivity by reacting the three metals with dilute hydrochloric acid.

She adds about 2 cm^3 of dilute hydrochloric acid into three different test-tubes labelled **A**, **B** and **C**.

She then puts magnesium ribbon in test-tube **A**, a copper foil in test-tube **B** and an iron nail into test-tube **C** and observes the three test-tubes at the same time.

Fig. 1.1 shows the set-up of the experiment.

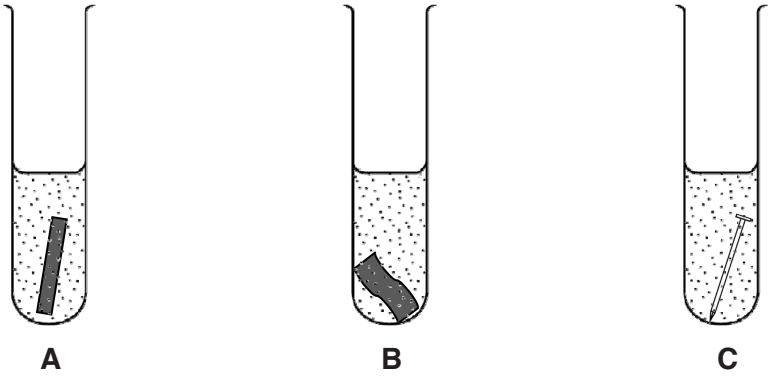

Fig. 1.1

Record her observations in Table 1.1.

Table 1.1

metal	observation with dilute hydrochloric acid
magnesium ribbon	
copper foil	
iron nail	

[3]

(iii) Arrange the **three** metals in their order of reactivity, starting with the most reactive.

most reactive .....

.....

least reactive ..... [2]

[Turn over

(c) **(i)** The student determines the type of oxide that is produced by magnesium.

She burns magnesium ribbon using a Bunsen burner flame.

State her observations.

.....

..... [2]

(ii) She pours about 6 cm^3 of water into a clean test-tube.

She then adds the substance formed in **(c)(i)** into the water and gently shakes the solution.

She tests the pH of the solution.

Describe how she tests the pH of the solution.

.....

..... [2]

(iii) Suggest the pH value of the solution.

pH value ..... [1]

(iv) Name the type of oxide formed when magnesium undergoes combustion.

..... [1]

(d) The student adds 2 cm^3 of the solution formed in **(c)(ii)** into another test-tube.

She then reacts the solution with dilute hydrochloric acid until a neutral solution is formed.

Describe how the student can obtain crystals from the neutral solution.

.....

..... [2]

(e) She places about 3 cm^3 of the remaining solution from **(c)(ii)** in another clean test-tube.

She adds sodium hydroxide solution and a white precipitate is formed.

If the reaction had been carried out on a larger scale in a school laboratory, draw the apparatus that she can use to separate the white precipitate formed.

[3]

(f) State **one** precaution to be taken when handling acids.

..... [1]

[Turn over

2 Musa carries out an experiment to investigate some factors that affect the strength of an electromagnet.

He sets up the circuit as shown in Fig. 2.1.

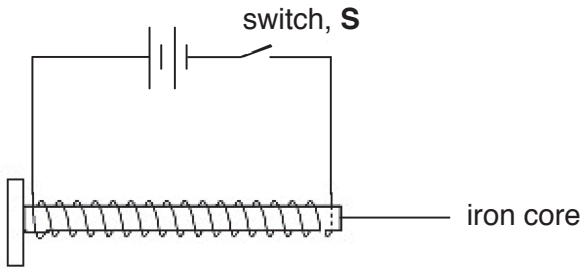

Fig. 2.1

(a) (i) He closes the switch, **S**.

He brings a paper clip closer to one end of the core.

State the observation he makes.

..... [1]

(ii) He then brings a permanent magnet with its North Pole closer to the end of the paper clip, but not touching, as shown in Fig. 2.2.

The paper clip moves away from the permanent magnet.

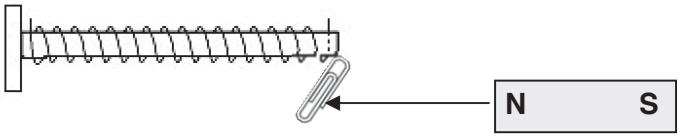

Fig. 2.2

Deduce and label the polarity of the paper clip and the electromagnet on Fig. 2.2. [2]

(b) He adds another paper clip at the end of the first paper clip.

He keeps adding paper clips at the end of the previous paper clip until no additional paper clips are attracted.

Table 2.1 shows the maximum number of paper clips attached.

Table 2.1

number of turns	number of cells	number of paper clips attached
30	2	3

(i) Explain why the second paper clip is attracted to the first one.

.....

..... [1]

(ii) Explain why no additional paper clips could be attached.

.....

.....

..... [2]

(iii) He opens switch **S**.

State and explain what happens when he opens switch **S**.

.....

.....

..... [2]

(c) He keeps the number of turns at 30.

He adds one more cell in the circuit.

He closes switch **S**.

He repeats the procedure in **(b)**

(i) Suggest the number of paper clips that will be attracted by the electromagnet.

..... [1]

(ii) Explain your answer.

.....

.....

..... [2]

(d) He increases the number of turns on the electromagnet to 60 and maintains the three cells.

He closes switch **S**.

He repeats the procedure in **(b)**.

(i) Predict the number of paper clips that will be attracted by the electromagnet.

..... [1]

(ii) Explain your answer.

.....

.....

..... [2]

(e) Suggest **one** way by which he may improve the accuracy of the experiment.

.....

..... [1]

(f) Fig. 2.3 shows an electromagnet.

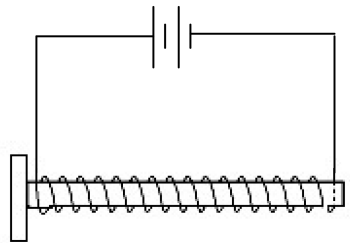

Fig. 2.3.

Describe an experiment he can carry out to show the magnetic field lines of the electromagnet in Fig. 2.3.

.....

.....

..... [3]

(g) He replaces the iron core with an aluminium rod.

He keeps the number of cells at three and the number of turns at 60**.**

He observes that no paper clips are attracted.

Explain his observation.

.....

..... [1]

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