



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

CANDIDATE  
NAME

CENTRE  
NUMBER

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CANDIDATE  
NUMBER

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**PHYSICAL SCIENCE**

**0652/02**

Paper 2 (Core)

**October/November 2008**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**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 a soft pencil for any diagrams, graphs, tables or rough working.

Do not use staples, paper clips, highlighters, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

A copy of the Periodic Table is printed on page 16.

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	
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10	
11	
12	
<b>Total</b>	

This document consists of **14** printed pages and **2** blank pages.



- 1 A student investigates the current-voltage characteristic for a lamp. She builds the circuit shown in Fig. 1.1.

For  
Examiner's  
Use

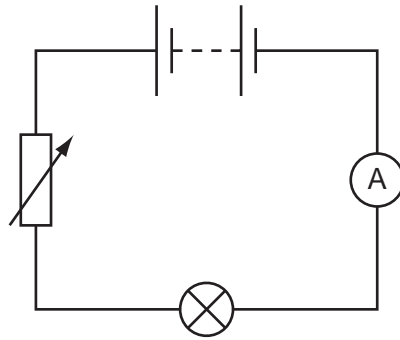


Fig. 1.1

- (a) Show where the voltmeter should be connected on Fig. 1.1 [2]
- (b) From her results the graph in Fig. 1.2 is plotted.

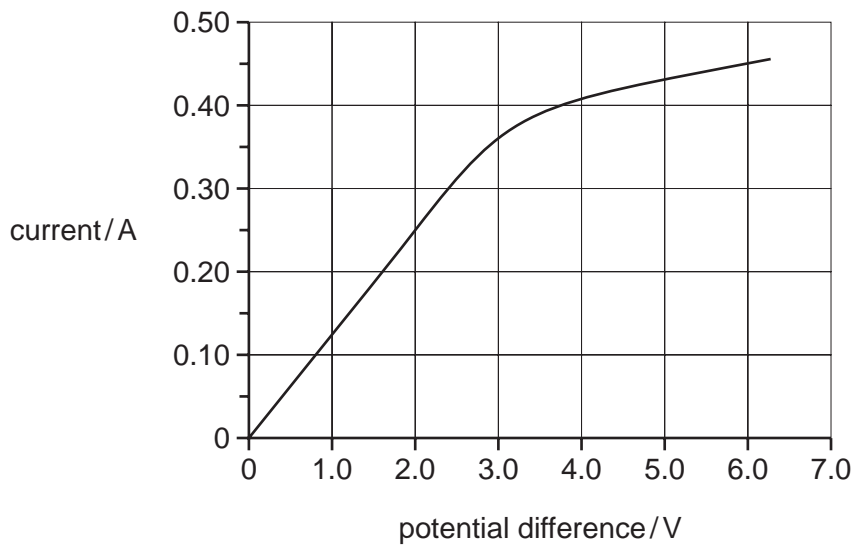


Fig. 1.2

- (i) What is the current when there is a potential difference of 2.0 V across the bulb?

..... [1]

- (ii) Calculate the resistance of the lamp when the potential difference is 2.0 V.

Show your working.

resistance = ..... [3]

- (iii) Use the graph to deduce what happens to the resistance of the lamp as the current is increased above 0.30 A.

Suggest a reason for the change.

.....  
 .....  
 ..... [2]

- 2 (a) Complete Table 2.1 by writing in the missing formulae and types of bonding.

**Table 2.1**

compound	formula	type of bonding
sodium chloride	NaCl	ionic
methane		
potassium bromide		

[4]

- (b) Give the names and symbols of the ions present in sodium chloride.

ion 1 ..... symbol .....

ion 2 ..... symbol ..... [4]

- 3 Fig. 3.1 shows a 0.20 kg mass hanging on a spring.

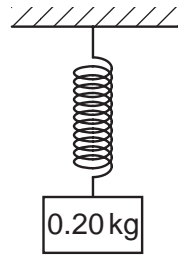


Fig. 3.1

- (a) (i) Calculate the weight of the mass.  
( $g = 10 \text{ N/kg}$ )

Show your working.

weight = .....

- (ii) Write down the force acting on the mass due to the spring.

force = ..... [3]

- (b) The mass is pulled down a short distance and released.

- (i) Draw an arrow on Fig. 3.1 and label it  $F$ , to show the direction of the resultant force on the mass immediately after it is released. [1]

- (ii) State what would happen to the mass immediately after it is released.

.....  
..... [2]

- 4 Bromine can be extracted from seawater.  
The sodium bromide in seawater is reacted with chlorine to displace the bromine.

For  
Examiner's  
Use

- (a) What is the name given to all of the elements in Group 7 of the Periodic Table?

..... [1]

- (b) How many electrons are in the outer shell of bromine?

..... [1]

- (c) Write a balanced equation for the displacement reaction between sodium bromide, NaBr, and chlorine, Cl<sub>2</sub>.

..... [2]

- (d) Explain why iodine cannot be used to displace bromine from sodium bromide.

.....  
.....

..... [2]

- (e) Give the name, atomic number and relative atomic mass of another element in the same period of the Periodic Table as chlorine.

The Periodic Table is printed on page 16.

element .....

atomic number .....

relative atomic mass ..... [3]

5 Fig. 5.1 shows a liquid-in-glass thermometer.

For  
Examiner's  
Use

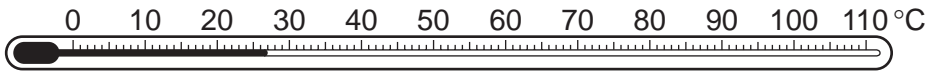


Fig. 5.1

(a) (i) Name a suitable liquid to use in the thermometer.

..... [1]

(ii) Explain what happens to the liquid when the thermometer is placed in a beaker of hot water.

.....  
 .....  
 ..... [2]

(iii) Name the main process by which energy is transferred from the hot water to the liquid in the thermometer.

..... [1]

(b) The thermometer is now placed in pure boiling water.

(i) What temperature would the thermometer show? ..... [1]

(ii) Explain what is meant by the term *boiling*.

.....  
 .....  
 ..... [2]

6 Table 6.1 gives the names and formulae of some organic compounds

For  
Examiner's  
Use

**Table 6.1**

name of compound	formula
methanol	CH <sub>3</sub> OH
ethanol	C <sub>2</sub> H <sub>5</sub> OH
propanol	
butanol	C <sub>4</sub> H <sub>9</sub> OH
pentanol	C <sub>5</sub> H <sub>11</sub> OH

(a) (i) Name the type of organic compounds listed in the table.

..... [1]

(ii) What is the name given to a series of compounds like these?

..... [1]

(b) Complete the table by writing in the formula for propanol.

[1]

(c) Draw the structure of ethanol.

[1]

(d) Give **two** uses of ethanol.

(i) .....

(ii) ..... [2]

- 7 (a) Fig. 7.1 shows a ripple tank with three wavefronts approaching an area of shallow water.

For  
Examiner's  
Use

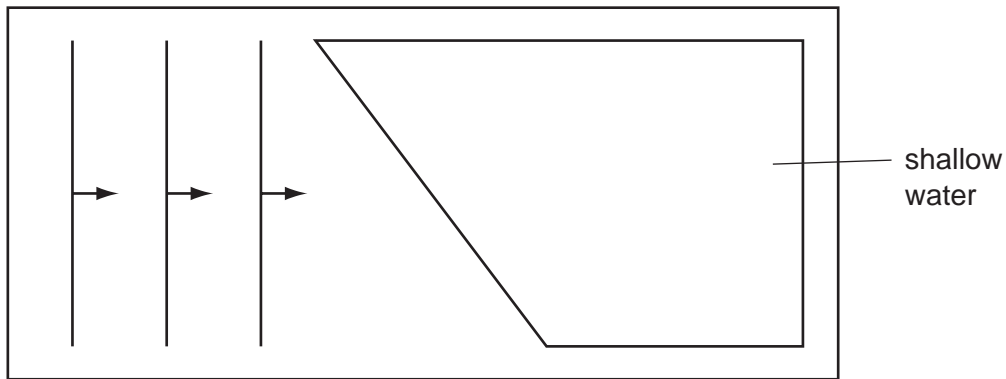


Fig. 7.1

- (i) On Fig 7.1, draw **four** more wavefronts to complete the diagram. [3]
- (ii) Name the process being demonstrated. [1]
- (b) Fig. 7.2 shows a similar ripple tank, with waves approaching a barrier that reflects water waves.

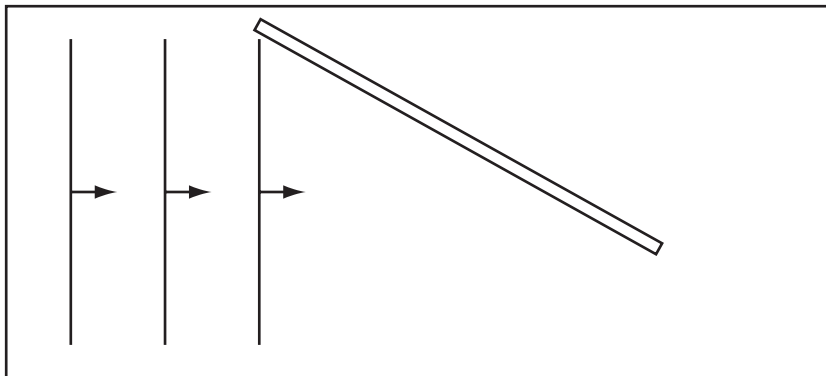


Fig. 7.2

- On Fig. 7.2, draw in four more wavefronts to complete the diagram. [3]



8 Small pieces of metallic gold can be found in the gravel at the bottom of streams.

Sodium is obtained by the electrolysis of one of its compounds.

Iron is extracted by reduction of its ore with carbon in a blast furnace.

For  
Examiner's  
Use

(a) (i) Put these three metals in order of reactivity.

most reactive .....

.....

least reactive .....

[2]

(ii) Suggest where you would place carbon in this list?  
Explain your answer.

.....

.....

..... [2]

(b) Name an ore of iron.

..... [1]

(c) Stainless steel is a mixture of iron and chromium.

(i) What name do we give to mixtures of metals like stainless steel?

..... [1]

(ii) Give a use of stainless steel.

..... [1]

9 (a) A student arranges two magnets so that magnet **B** balances as in Fig. 9.1.

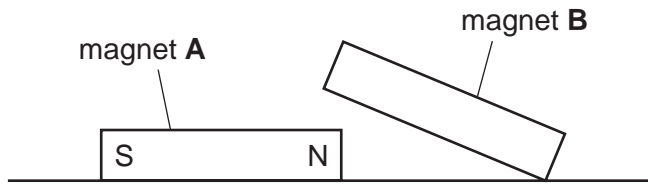


Fig. 9.1

(i) Label the poles of magnet **B** [1]

(ii) Explain why magnet **B** can be balanced in this way.

.....  
 .....  
 ..... [2]

(b) The student brings a magnet near to an iron bar.



Fig. 9.2

What happens when:

The magnet is brought up to end **Y**? .....

The magnet is brought up to end **X**? ..... [1]

(c) He wraps a length of wire around the iron bar. He connects the wire to a battery so that there is a current in the wire.

He repeats the experiment in (b).  
 Explain how you would expect the results to change

.....  
 .....  
 ..... [2]

10 Fig. 10.1 shows an experiment to measure the volume of oxygen in 100 cm<sup>3</sup> of air.

Oxygen reacts with iron to form a solid compound.

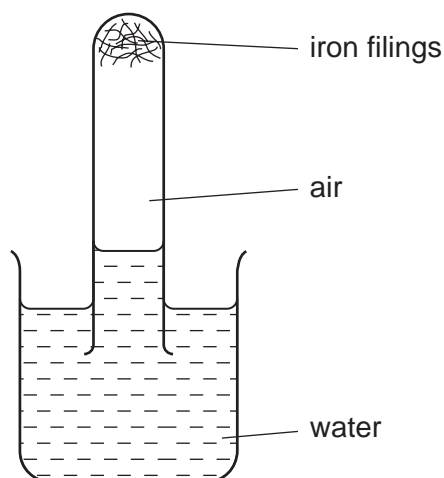


Fig. 10.1

(a) What do we call reactions which involve the addition of oxygen?

..... [1]

(b) What type of compound is formed when an element reacts with oxygen?

..... [1]

(c) (i) What volume of gas remains in the tube when all the oxygen has reacted?

..... [1]

(ii) Name the main gas in the tube after the oxygen has reacted.

..... [1]

For  
Examiner's  
Use

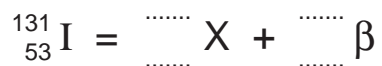
11 The iodine isotope,  ${}_{53}^{131}\text{I}$ , decays by emitting a  $\beta$ -particle.

For  
Examiner's  
Use

(a) Explain what is meant by a  $\beta$ -particle.

.....  
..... [2]

(b) (i) Complete the equation which describes the decay.



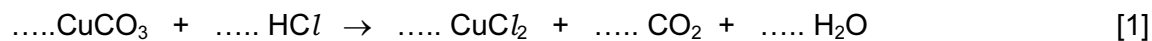
(ii) Use the Periodic Table, on page 16, to identify the element X and comment on its reactivity.

.....  
..... [4]

12 A sample of copper chloride is made by reacting excess copper carbonate with hydrochloric acid.

For  
Examiner's  
Use

(a) Balance the equation for this reaction.



(b) (i) Name the gas evolved.

..... [1]

(ii) Describe a test for this gas.

.....  
.....  
..... [2]

(c) How could you obtain pure copper chloride crystals from the resulting mixture ?

.....  
.....  
..... [2]





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																													
		I	II	III	IV	V	VI	VII	VIII	IX	X																				
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 5%;"></td> <td style="width: 5%;"></td> <td style="width: 5%;">1 <b>H</b> Hydrogen 1</td> <td colspan="9"></td> </tr> </table>												1 <b>H</b> Hydrogen 1																	
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\*58-71 Lanthanoid series  
†90-103 Actinoid series

		a		X		b
Key		a = relative atomic mass	X = atomic symbol	b = proton (atomic) number		

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).

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