UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0350997671

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	
2	
3	
4	
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7	
8	
9	
10	
11	
12	
Total	

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

UNIVERSITY of CAMBRIDGE International Examinations

For Examiner's Use

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

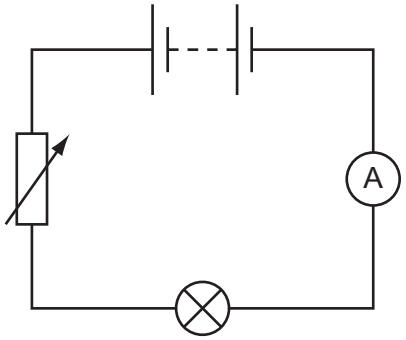

Fig. 1.1

(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.

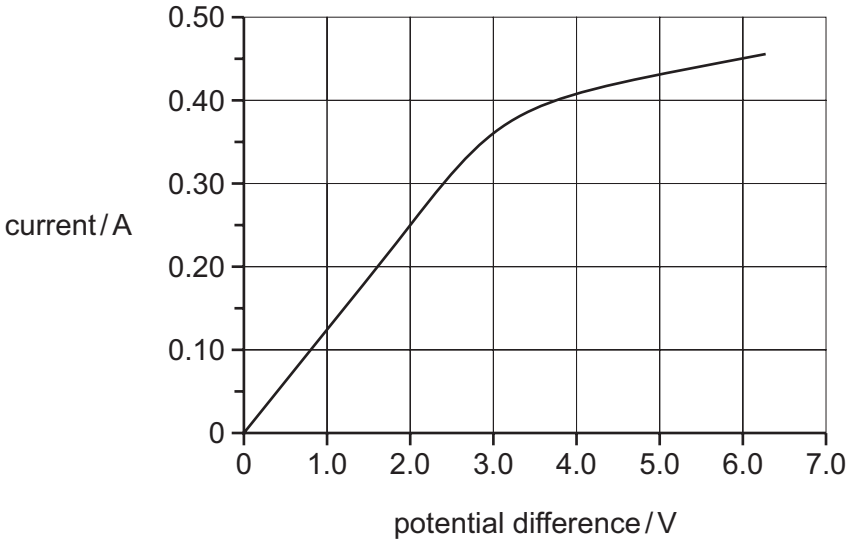

Fig. 1.2

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

..... [1]

For Examiner's Use

(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	NaC*l*	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]

For Examiner's Use

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

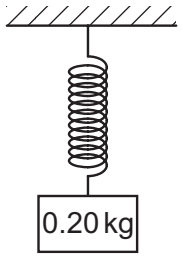

Fig. 3.1

(a) (i) Calculate the weight of the mass.
(g = 10 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]

For Examiner's Use

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

(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_2.

.....

[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]

For Examiner's Use

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

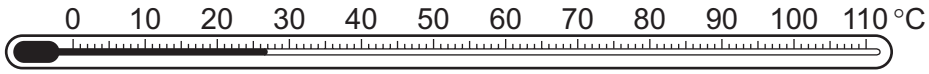

Fig. 5.1

(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]

For Examiner's Use

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

Table 6.1

name of compound	formula
methanol	CH_3OH
ethanol	C_2H_5OH
propanol	
butanol	C_4H_9OH
pentanol	$C_5H_{11}OH$

(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]

For Examiner's Use

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

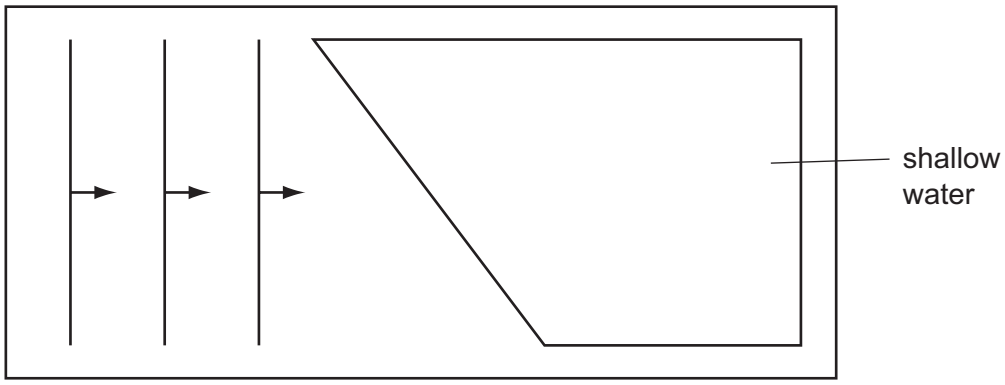

Fig. 7.1

(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.

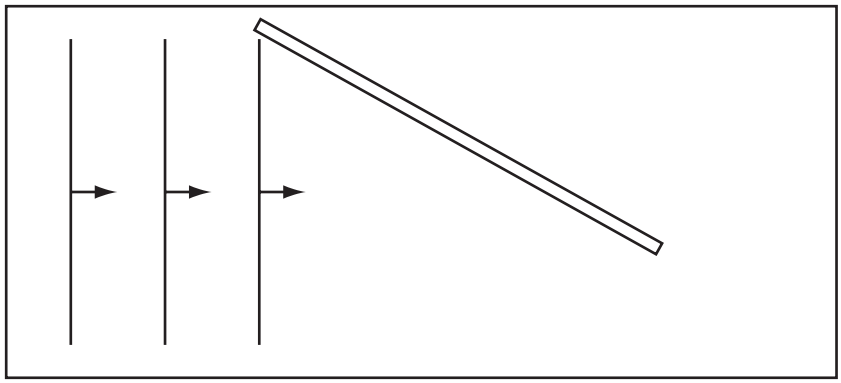

Fig. 7.2

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

For Examiner's Use

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.

(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]

For Examiner's Use

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

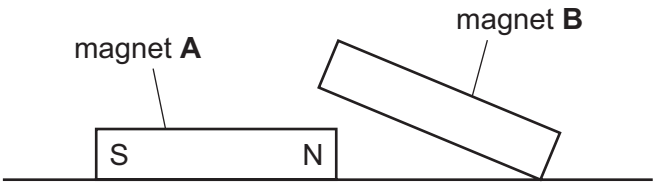

Fig. 9.1

(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.

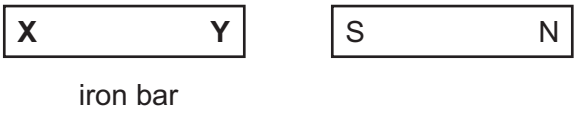

Fig. 9.2

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^3 of air.

Oxygen reacts with iron to form a solid compound.

For Examiner's Use

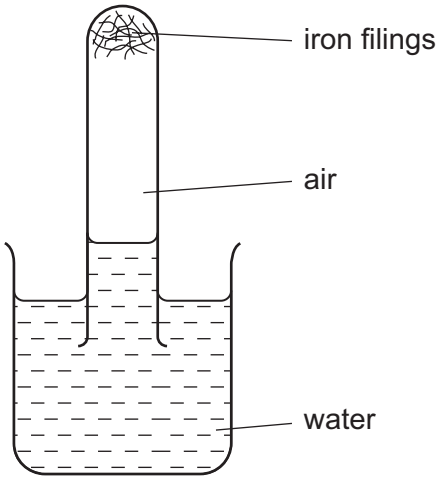

Fig. 10.1

(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, $^{131}_{53}I$, decays by emitting a β–particle.

(a) Explain what is meant by a β–particle.

.....

..... [2]

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

$$^{131}_{53}I = \ ^{\cdots\cdots}_{\cdots\cdots}X + \ ^{\cdots\cdots}_{\cdots\cdots}\beta$$

(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.

….. $CuCO_3$ + ….. HCl → ….. $CuCl_2$ + ….. CO_2 + ….. H_2O [1]

(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]

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 **H** Hydrogen 1										4 **He** Helium 2
7 **Li** Lithium 3	9 **Be** Beryllium 4											11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12											27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulphur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key: a above **X**, b below

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

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