EXAMINATIONS COUNCIL OF SWAZILAND
in collaboration with
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE
Swaziland General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

7649841917

PHYSICAL SCIENCE **6888/02**

Paper 2 Core **October/November 2012**

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 in the spaces provided on the Question Paper.
Do **not** use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
A copy of the Periodic Table is printed on page 16.

You may use a calculator.

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	
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15	
Total	

This document consists of **16** printed pages.

1 Fig. 1.1 shows how a solid such as ice changes as it is heated. Fig. 1.2 shows the arrangement of the particles as the solid is heated, but the order has been changed.

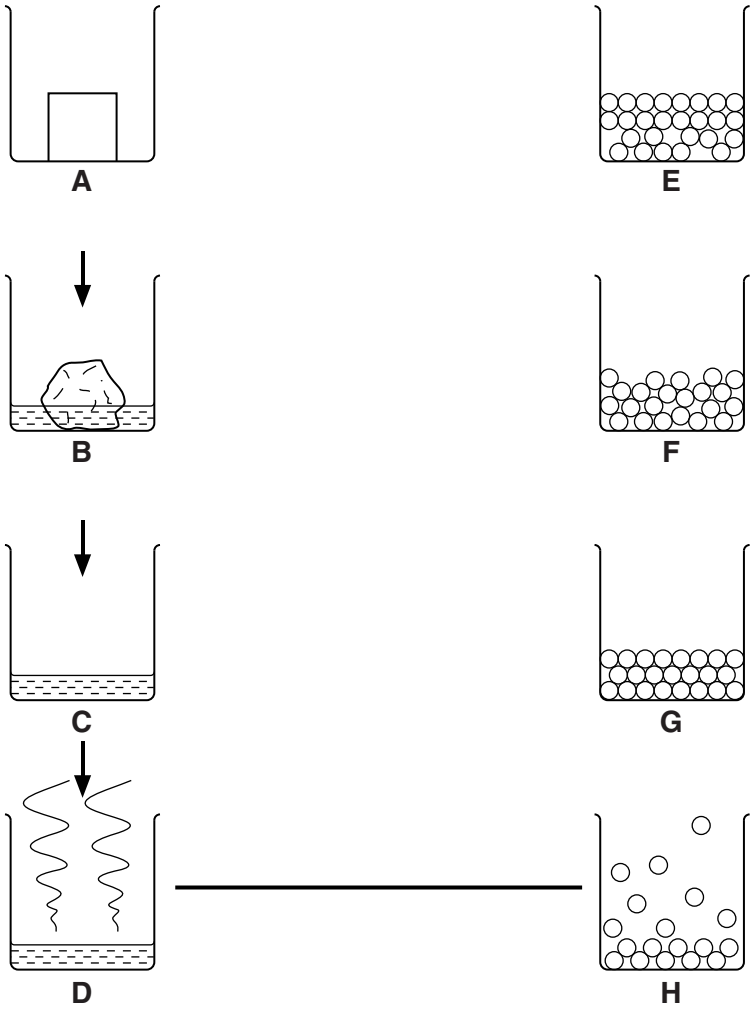


Fig. 1.1 **Fig. 1.2**

(a) Draw lines to match the diagrams on Fig. 1.1 to corresponding diagrams on Fig. 1.2.

One line has been drawn for you. [2]

(b) State which diagram, **A**, **B**, **C** or **D**, shows the ice in the process of melting.

..... [1]

(c) Melting is an example of a physical change.

Explain what is meant by a *physical change*.

.....

..... [1]

2 **(a)** A student is to find the density of a metal block.

He measures the mass of the block and records the reading.

Mass of block = 105 g

(i) Name an instrument he could use to measure the mass of the block.

..... [1]

(ii) State the **SI** base unit for mass.

..... [1]

(b) He partly fills a measuring cylinder with water and totally immerses the block in the water.

He records the readings:

Volume of water = 160.0 cm^3
Volume of water plus block = 172.5 cm^3

Calculate the density of the metal block.

density = ... g/cm^3 [3]

[Turn over

3 Fig. 3.1 shows how two metals can be used to generate an e.m.f.

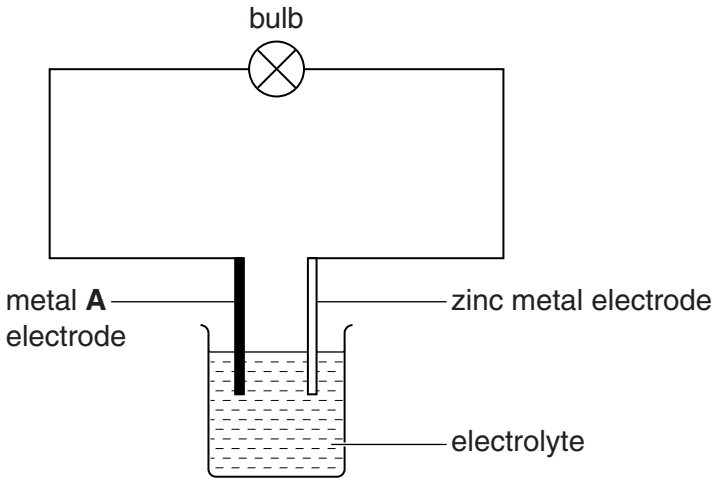


Fig. 3.1

(a) Name a metal that can be used as metal **A**.

..... [1]

(b) **(i)** Suggest a suitable electrolyte for this reaction.

..... [1]

(ii) Give the formulae of the two ions in this electrolyte.

1 .....

2 ..... [2]

(c) Show, using an arrow, the direction of the current **in** the cell.

..... [1]

(d) Describe the reaction that occurs at the zinc electrode.

Include the ionic equation for the reaction.

description .....

.....

equation .....

[2]

(e) State what would be observed at the metal **A** electrode.

..... [1]

4 Fig. 4.1 shows water waves on a pond.

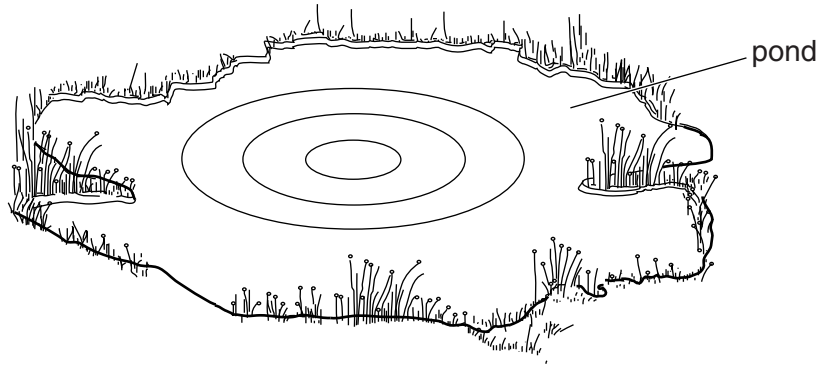


Fig. 4.1

(a) Name the type of wave shown in the diagram.

..... [1]

(b) The wave in Fig. 4.1 has a frequency of 2 Hz.

Explain what is meant by *a frequency of 2 Hz*.

.....

.....

..... [2]

(c) Fig. 4.2 shows a graph of the displacement of the particles in the pond at a particular instant as the wave passes.

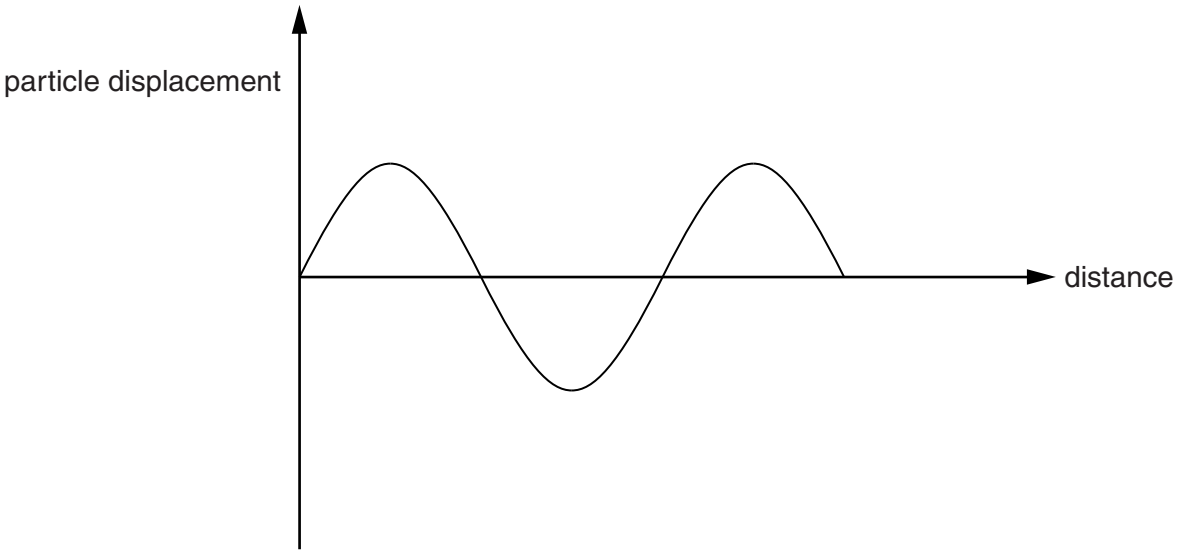


Fig. 4.2

On Fig. 4.2 draw a wave with the same wavelength but with a smaller amplitude. [2]

5 Hlobi is to prepare crystals of an insoluble salt silver chloride, AgC*l*.

She adds potassium chloride, KC*l*, in solution to silver nitrate, $AgNO_3$, also in solution.

(a) (i) Describe what Hlobi observes.

.....

..... [1]

(ii) Complete the equation which shows this reaction.

$$KCl + AgNO_3 \longrightarrow \text{.....} \; AgCl + \text{.....} \qquad [2]$$

(b) Describe the steps that Hlobi must take to obtain a sample of pure silver chloride.

Draw a labelled diagram to show how she would use apparatus to produce this sample of pure silver chloride.

.....

.....

.....

.....

.....

.....

.....

[5]

6 Fig. 6.1 shows the relative positions of electromagnetic radiations in terms of increasing frequency.

I	microwaves	infra-red	visible light	ultra-violet	**J**	gamma rays

Fig. 6.1

(a) Name the radiations marked **I** and **J**.

I .....

J ..... [2]

(b) Name the radiation with the shortest wavelength in Fig. 6.1.

..... [1]

(c) Name the member of the electromagnetic spectrum that transfers thermal energy.

..... [1]

7 Fig. 7.1 shows part of the Periodic Table.

							He
			C	N	O	F	Ne
	Mg		Si		S	C*l*	

Fig. 7.1

(a) Choose from these elements

(i) a monoatomic gas,

..... [1]

(ii) two elements whose molecules are normally far apart at room temperature,

1 .....

2 ..... [2]

(iii) two elements whose atoms are closely packed at room temperature.

1 .....

2 ..... [2]

(b) Two of the elements shown in Fig. 7.1 show a property known as allotropy.

(i) Name **one** of these elements.

..... [1]

(ii) Explain the meaning of the term *allotropy*.

.....

.....

..... [2]

8 Fig. 8.1 shows a uniform metal rod, of length 60 cm, balanced on a pivot. The pivot is 15 cm from one end.

A weight of 1.5 N is hung from the rod at a distance of 12 cm from the pivot.

The weight *W* of the rod acts at its centre.

(g = 10 N/kg)

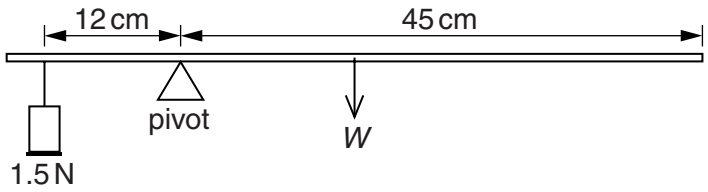


Fig. 8.1

Calculate;

(a) the weight, *W*, of the rod,

W = ... N [3]

(b) the mass of the rod.

mass ..... kg [1]

9 Iron is extracted from its ore by reduction in a blast furnace.

(a) (i) State the name of an ore of iron.

..... [1]

(ii) State **one** other raw material added at the top of the blast furnace.

..... [1]

(b) The equation shows one of the key reactions in the extraction of iron from its ore.

$$Fe_2O_3 + 3CO \longrightarrow 2Fe + 3CO_2$$

(i) Name the reducing agent in this reaction.

..... [1]

(ii) Explain reduction by referring to the chemical reaction in **(b)**.

.....

.....

..... [2]

10 Thando fails to open a mayonnaise bottle with a metallic screw-on lid by hand.

Suggest and explain how she can easily open the bottle using hot water.

method .....

.....

explanation .....

.....

.....

[3]

11 A person connects a fused 13 A plug to an air conditioning unit. The diagram, Fig. 11.1, shows the wiring in this plug.

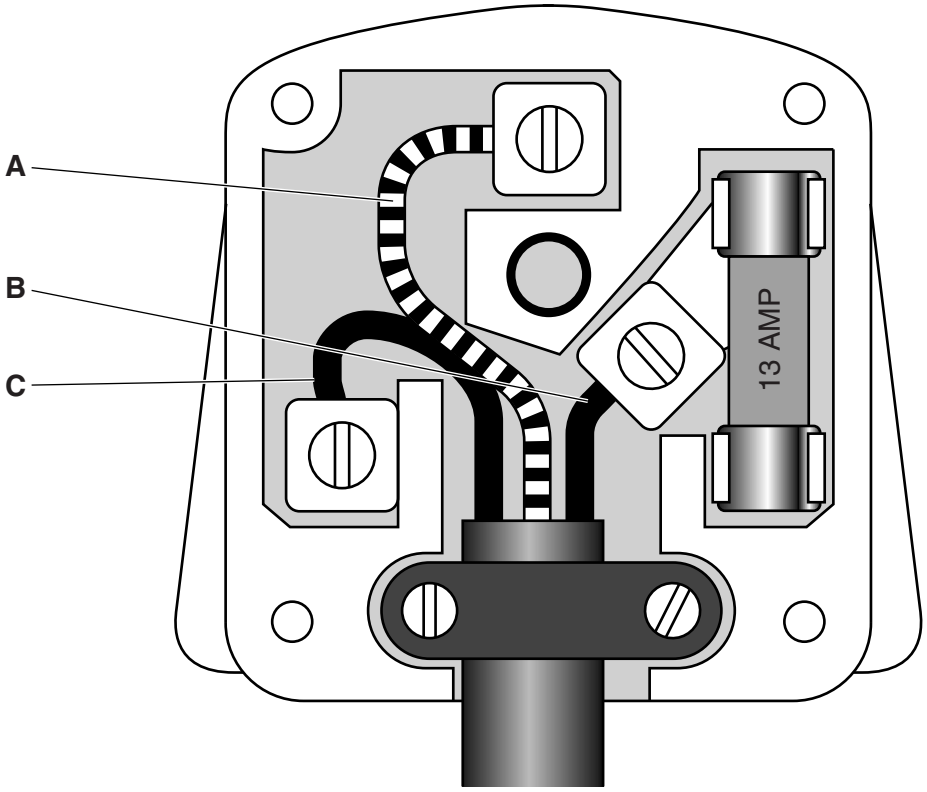


Fig. 11.1

(a) State the name and colour of each of the three wires labelled **A**, **B** and **C**.

wire	name	colour
A		
B		
C		

[3]

(b) Explain why damaged insulation on a current carrying wire is dangerous.

.....

.....

..... [2]

[Turn over

12 The compounds ethanol and methanol belong to the same homologous series.

(a) Name this homologous series.

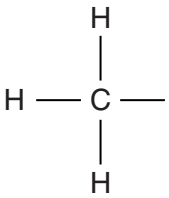
..... [1]

(b) Describe **one** characteristic that shows that ethanol and methanol are in the same homologous series.

.....

..... [2]

(c) Complete the diagram below to show the structure of ethanol.



[1]

(d) Ethanol can be prepared from ethene.

(i) State the formula for ethene.

..... [1]

(ii) State the name of the substance that reacts with ethene to form ethanol.

..... [1]

(e) State **one** use of ethanol.

..... [1]

13 Fig. 13.1 shows a 3Ω and a 6Ω resistor connected in series with a 12V battery.

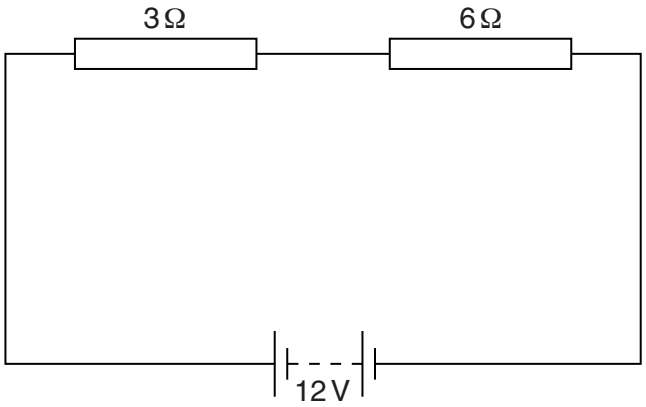


Fig. 13.1

(a) Calculate

(i) the combined resistance of the resistors,

..... Ω [1]

(ii) the current through the battery.

..... [3]

(b) State the current through the 3Ω resistor.

..... [1]

[Turn over

14 Fig. 14.1 shows a deflection tube which is used to investigate properties of cathode rays.

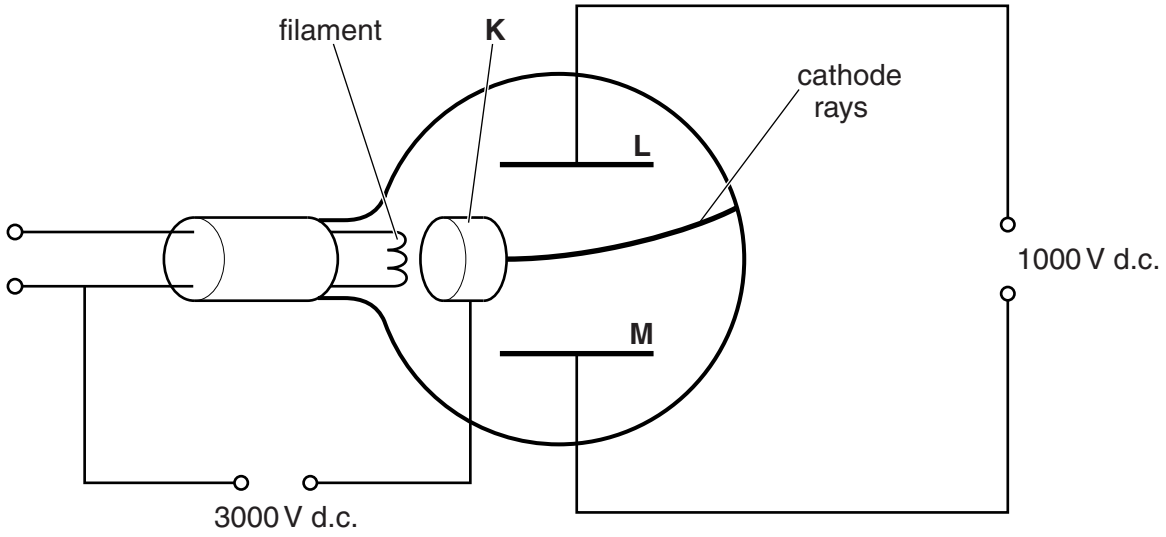


Fig. 14.1

(a) State the nature of cathode rays.

.....

..... [1]

(b) Plate **L** is positively charged.

(i) State and explain the experimental evidence which confirms this.

evidence .....

.....

explanation .....

.....

[2]

(c) Name the process by which the cathode rays are emitted by the filament.

..... [1]

(d) State the function of part **K**.

..... [1]

15 **(a)** A Geiger-Muller (G-M) tube is placed on a table in the laboratory.

There are no radioactive sources in the laboratory.

Nevertheless, there is a reading of 20 counts per minute on the G-M tube.

Explain what causes this reading.

..... [1]

(b) 12 g of a radioactive nuclide, radon-222, has a half-life of approximately 4 days.

(i) State the meaning of the term *half-life*.

.....

..... [1]

(ii) Find the mass of radon-222 remaining after 12 days.

Show your working.

mass ..... g [2]

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 Sulfur 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	209 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86
223 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	147 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	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	243 Am Americium 95	247 Cm Curium 96	247 Bk Berkelium 97	251 Cf Californium 98	252 Es Einsteinium 99	257 Fm Fermium 100	258 Md Mendelevium 101	259 No Nobelium 102	260 Lr Lawrencium 103

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

Key

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

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