



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE
NAME

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PHYSICAL SCIENCE

0652/02

Paper 2 (Core)

October/November 2007

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	
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11	
12	
13	
Total	

This document consists of **15** printed pages and **1** blank page.



1 Fig. 1.1 shows the speed of a car as it moves along a straight, level track.

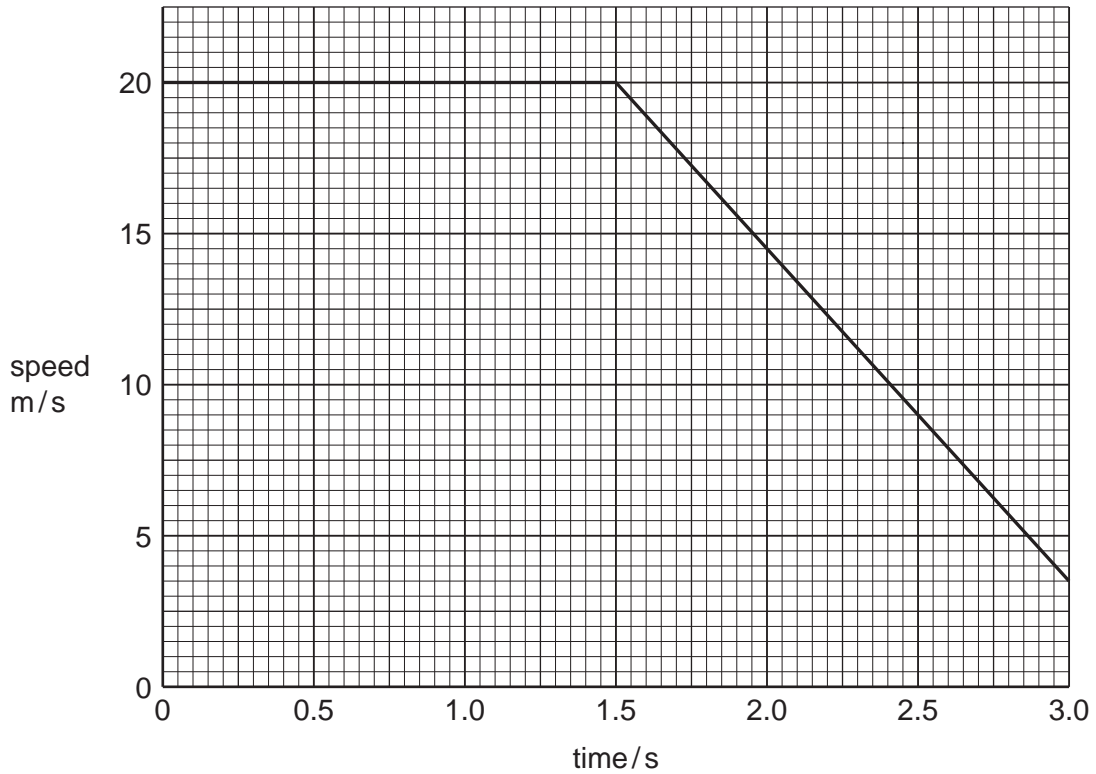


Fig. 1.1

(a) What was the initial speed of the car? m/s [1]

(b) Describe the motion of the car during

(i) the first 1.5 s,

.....

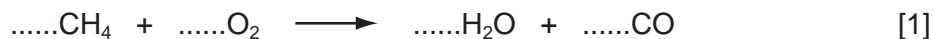
(ii) from 1.5 s to 3.0 s.

..... [3]

(c) Calculate the distance the car travelled in the first 1.5 s.
Show your working.

distance = unit [3]

- 2 (a) Balance this equation for the burning of methane in a limited supply of air.



- (b) Explain why it is dangerous to release carbon monoxide into the air.

.....

 [2]

- (c) Name the compound of carbon formed when methane burns in a plentiful supply of air.

..... [1]

- 3 Complete Table 3.1 by giving the formula of each of these pollutants, naming a source of each, and a problem caused by releasing each into the atmosphere.

Table 3.1

pollutant	formula	source	problem
sulphur dioxide			
nitrogen dioxide			

[6]

- 4 Fig. 4.1 shows a view from above as a set of ripples move out from a point when a stone is thrown into a pond.

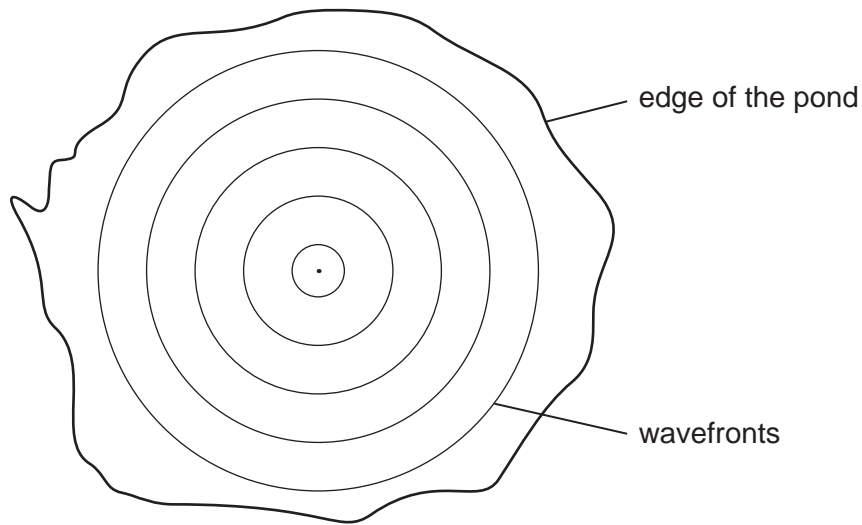


Fig. 4.1

- (a) (i) Mark on Fig. 4.1 one wavelength and label it λ .
- (ii) A boy counts 12 waves hitting the bank in 5.0 s.
Calculate the frequency of the waves.
Show your working.

frequency = unit [4]

- (b) The water is shallower near the bank and the waves slow down.
Suggest what effect that this will have on

(i) the wavelength of the waves,

.....

(ii) the frequency of the waves.

..... [2]

- 5 Fig. 5.1 shows three test-tubes with pieces of different metal foil added to solutions containing metal ions.

The observations seen in each test-tube are also given.

<p>magnesium</p> <p>Cu^{2+} ions in solution</p>	<p>zinc</p> <p>Cu^{2+} ions in solution</p>	<p>zinc</p> <p>Mg^{2+} ions in solution</p>
<p>magnesium disappears</p> <p>copper-coloured solid formed</p>	<p>zinc becomes copper-coloured</p>	<p>no reaction</p>

Fig. 5.1

- (a) Use the results to work out the order of reactivity of the three metals.

most reactive

.....

least reactive

[2]

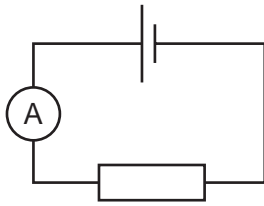
- (b) Complete this equation for the reaction when magnesium is added to aqueous copper(II) sulphate.



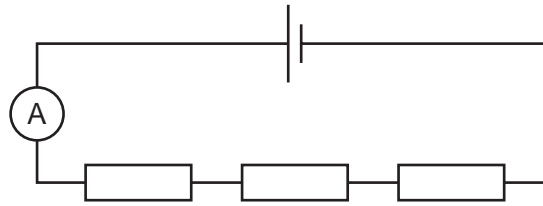
- (c) What happens when a piece of copper foil is put into a solution containing magnesium ions?

..... [1]

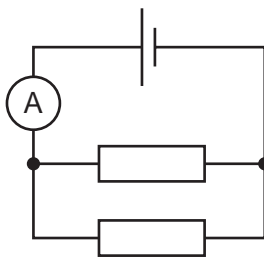
- 6 A student has a cell, three identical resistors, and an ammeter. He builds the circuits shown in Fig. 6.1.



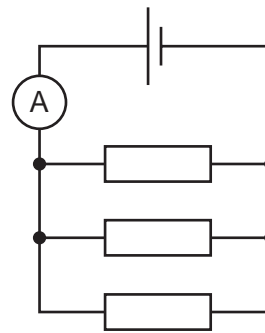
circuit 1



circuit 2



circuit 3



circuit 4

Fig. 6.1

- (a) (i) In which circuit is the ammeter reading the highest?

circuit

- (ii) Explain your answer.

.....

 [3]

(b) The student now rebuilds circuit 2 as shown in Fig. 6.2.

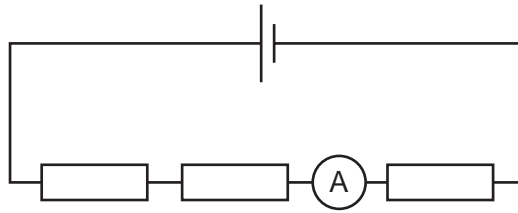


Fig. 6.2

Explain, giving a reason, how the ammeter reading compares with the reading in the original circuit 2.

.....
 [2]

(c) He now rebuilds circuit 3, as shown in Fig. 6.3.

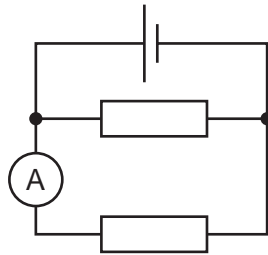


Fig. 6.3

Explain, giving a reason, how the ammeter reading compares with the reading in the original circuit 3.

.....
 [2]

7 Sodium is an element in Group I of the Periodic Table.

(a) Complete Table 7.1 for an atom of sodium by reference to the Periodic Table shown on page 16.

Table 7.1

proton (atomic) number	
relative atomic mass	
number of neutrons in the nucleus	
arrangement of electrons in shells	

[4]

(b) Write down the name and symbol of a Group I element which is less reactive than sodium.

name

symbol

[2]

8 Fig. 8.1 shows the apparatus used to compare the penetration of different radioactive emissions.

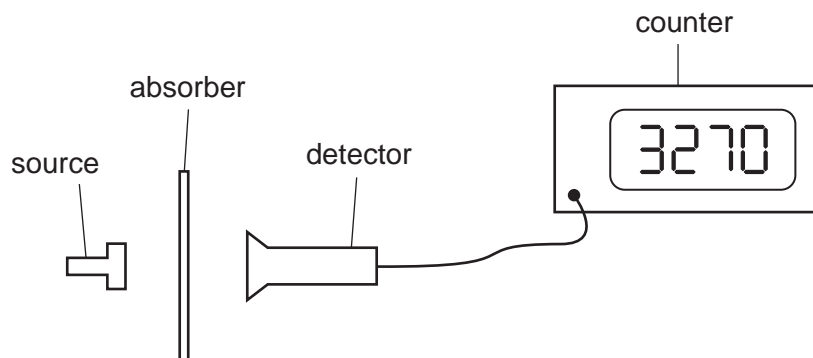


Fig. 8.1

Table 8.1 shows the count obtained in 2 minutes using different sources, with different absorbers.

Table 8.1

source	count with no absorber	count with paper absorber	count with aluminium absorber	count with lead absorber
krypton-85	3270	3268	14	12
americium-240	5854	1649	1644	103

(a) (i) State, with reasons, the type or types of radiation emitted by the krypton-85 source.

.....
.....
.....

(ii) State, with reasons, the type or types of radiation emitted by the americium-240 source.

.....
.....
.....

..... [6]

(b) Care must be taken when handling or storing radioactive materials.

(i) State **one** precaution which must be used when handling radioactive materials.

.....
.....

(ii) State **one** precaution which must be used when storing radioactive materials.

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

9 Ethane and ethene are gases which can be obtained from crude oil.

(a) State the formula of ethene.

.....

[1]

(b) Describe the difference in the structures of ethane and ethene.

.....

.....

.....

[2]

(c) Describe a test to distinguish between ethane and ethene.

test

.....

result with ethene

.....

result with ethane

.....

[3]

(d) What do we call the process of making poly(ethene) from ethene?

.....

[1]

10 Fig. 10.1 shows the structure of a cathode ray tube.

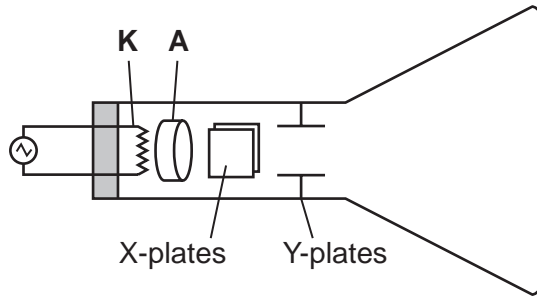


Fig. 10.1

(a) Explain how parts **K** and **A** produce cathode rays.

.....

.....

.....

.....

..... [4]

(b) Fig. 10.2a and Fig. 10.2b show two waveforms displayed on the cathode ray oscilloscope. The settings of the oscilloscope are the same in each case.

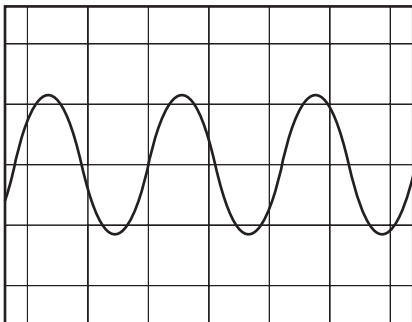


Fig. 10.2a

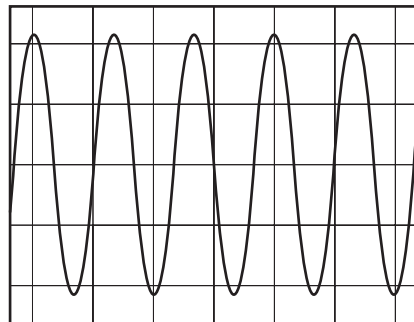


Fig. 10.2b

(i) State, giving a reason, which of the waves has the greater amplitude.

.....

.....

(ii) State, giving a reason, which of the waves has the greater frequency.

.....

.....

..... [3]

11 Limestone is an important raw material.

(a) Give the name and formula of the main calcium compound present in limestone.

name

formula [2]

(b) (i) How can calcium oxide (lime) be made from limestone?

..... [1]

(ii) What needs to be added to calcium oxide to make calcium hydroxide (slaked lime)?

..... [1]

(iii) The reaction to make calcium hydroxide is exothermic.
What does *exothermic* mean?

..... [1]

(c) Why do farmers sometimes spread calcium hydroxide on the soil in their fields?

..... [1]

12 Fig. 12.1 shows a ray of light incident on a parallel sided glass block.

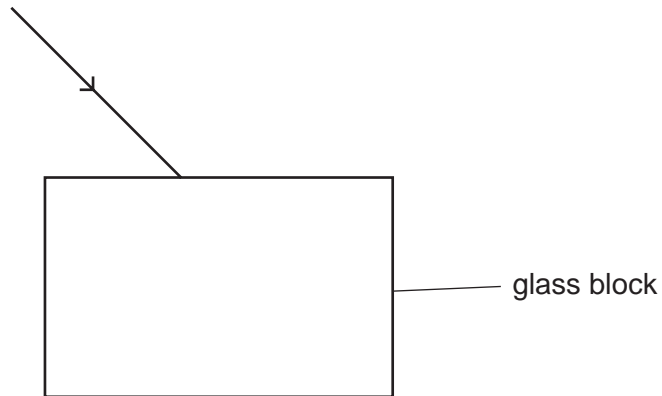


Fig. 12.1

- (a) Complete the path of the light as it passes through and leaves the block. [3]
- (b) Mark on Fig. 12.1
- (i) the angle of incidence and label it i ,
 - (ii) the angle of refraction and label it r . [2]

13 Chlorine is a reactive element in Group VII of the Periodic Table.

(a) Why is chlorine often added to drinking water supplies?

..... [1]

(b) Complete Table 13.1 by naming the type of bonding present in each of these substances.

Table 13.1

substance	type of bonding present
chlorine	
hydrogen chloride	
sodium chloride	

[2]

(c) (i) What is the symbol for a chloride ion?

..... [1]

(ii) How many electrons are in the outer shell of a chloride ion?

..... [1]

(iii) How is the electron structure of Group 0 elements such as neon similar to that of ions such as a chloride ion?

.....

 [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						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	56 Fe Iron 26	55 Mn Manganese 25	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	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	101 Ru Ruthenium 44	101 Rh Rhodium 45	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	127 I Iodine 53	131 Xe Xenon 54			
133 Cs Caesium 55	137 Ba Barium 56	186 Re Rhenium 75	184 W Tungsten 74	184 W Tungsten 74	192 Ir Iridium 77	195 Pt Platinum 78	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 Rn Radon 86			
226 Ra Radium 88	227 Ac Actinium 89														
		*58-71 Lanthanoid series †90-103 Actinoid series													
140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	144 Nd Neodymium 60	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	232 Pa Protactinium 91	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92

Key

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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