



## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

PHYSICAL SCIENCE 0652/12

Paper 1 Multiple Choice October/November 2012

45 minutes

Additional Materials: Multiple Choice Answer Sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

## **READ THESE INSTRUCTIONS FIRST**

Write in soft pencil.

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

Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.

Choose the one you consider correct and record your choice in soft pencil on the separate Answer Sheet.

## Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

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



1	Wh	ich meth	od can be	used to	obtain cryst	als fror	n aqueous	copp	er(II) sulf	ate?	
	Α	diluting									
	В	dissolvi	ing								
	С	evapora	ating								
	D	stirring									
2	Wh	nich diagr	am shows	s the arrai	ngement of	particle	es in a liqui	d?			
			Α		В		С			D	
3	Wh	at is diffe	erent for is	otopes of	f the same o	elemen	t?				
	Α	numbei	r of electro	ns							
	В	numbei	r of full she	ells							
	С	numbei	r of nucleo	ns							
	D	numbei	r of proton	s							
4	Sta	atements	1, 2 and 3	3 are abou	ut diamond	and gra	aphite.				
		1	They are	different	solid forms	of the	same elem	nent.			
		2	-		ct electricity						
		3	They hav	ve atoms	that form fo	ur equ	ally strong	bond	ls.		
	Wh	ich state	ments are	correct?							
	A	1 only	В	3 only	C	1 ar	nd 3	D	2 and 3		
5	Wh	nich comp	oound has	the large	est relative r	nolecul	ar mass, <i>l</i> l	1/ <sub>r</sub> ?			
	Α	CO <sub>2</sub>	В	NO <sub>2</sub>	C	SiO	2	D	SO <sub>2</sub>		

6 The chart shows the colour of Universal Indicator at different pH values.

colour	red		orange green			blue				violet				
рН	1	2	3	4	5	6	7	8	9	10	11	12	13	14

Lemon juice contains citric acid which is only slightly acidic.

What colour does lemon juice give with Universal Indicator?

- A blue
- **B** green
- **C** orange
- **D** red
- 7 Aqueous ammonia is added to a solution of a metal sulfate.

A green precipitate forms that is insoluble in excess of the aqueous ammonia.

Which metal ion is present?

A Cu<sup>2+</sup>

**B** Fe<sup>2+</sup>

**C** Fe<sup>3+</sup>

**D** Zn<sup>2+</sup>

8 The equation below shows the reaction that occurs when hematite is heated with carbon.

process X hematite + carbon 
$$\longrightarrow$$
 iron + carbon dioxide  $2Fe_2O_3$  +  $3C$   $4Fe$  +  $3CO_2$ 

What is the chemical name of hematite and what is process X?

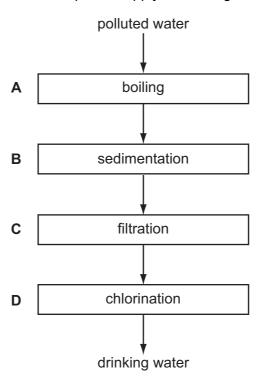
	chemical name	process X			
Α	iron(II) oxide	oxidation			
В	iron(II) oxide	reduction			
С	iron(III) oxide	oxidation			
D	iron(III) oxide	reduction			

9 Magnesium reacts with acids to produce hydrogen gas.

Under which set of conditions is hydrogen produced most slowly?

	magnesium	acid	temperature/°C
Α	ribbon	concentrated	40
В	ribbon	dilute	20
С	powder	concentrated	40
D	powder	dilute	20

10 Which stage is **not** used to obtain the public supply of drinking water from polluted water?

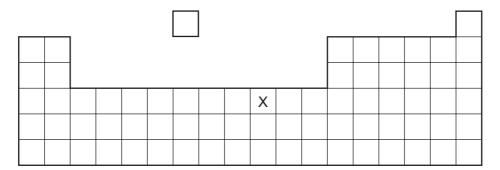


11 Metal M is formed when its oxide is heated with carbon.

Which deductions from this information are correct?

- 1 M is similar in reactivity to iron.
- 2 M is more reactive than potassium.
- 3 The oxide of M is acidic.
- A 1 only B 1 and 3 only C 2 only D 2 and 3 only

**12** The position of an element, X, in the Periodic Table is shown.



Which correctly describes X?

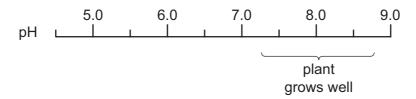
	density (g/dm³)	melting point (°C)				
Α	0.97	98				
В	1.96	119				
С	3.12	<b>–</b> 7				
D	8.90	1455				

13 Copper, iron and zinc are all used to make things.

Which of these three metals are also used in the form of alloys?

	copper	iron	zinc
Α	✓	✓	✓
В	✓	✓	X
С	X	✓	✓
D	X	X	✓

14 The diagram shows the pH range of soil in which a certain plant grows well.



The plant is to be grown in a field with a soil pH of 6.

What can be added to the soil to make the pH suitable?

- A lime
- **B** litmus
- C nitric acid
- D sodium chloride
- **15** In some reactions, carbon dioxide and water are both formed.

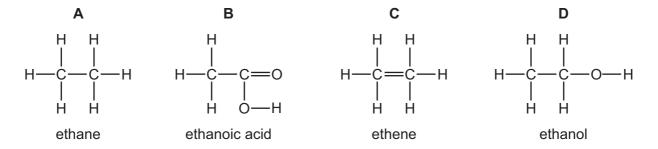
For which examples below is this statement correct?

- 1 burning of coal
- 2 reaction between an acid and a carbonate
- 3 respiration
- **A** 1 and 2 only **B** 1, 2 and 3 **C** 1 and 3 only **D** 2 and 3 only
- 16 Three carbon-containing fuels are listed below.
  - 1 coal
  - 2 natural gas
  - 3 petroleum

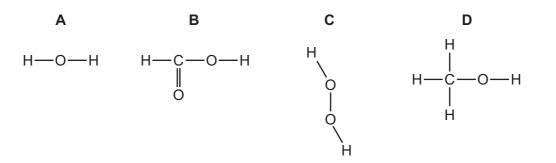
Which of these fuels are classified as 'fossil fuels' and which are fractionally distilled?

	fossil fuels	fractionally distilled
Α	1, 2 and 3	1 and 3 only
В	1, 2 and 3	3 only
С	1 and 3 only	1 and 3 only
D	1 and 3 only	3 only

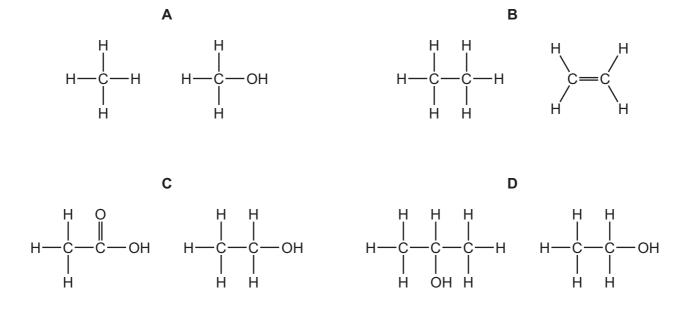
17 Which structure is **not** correct?



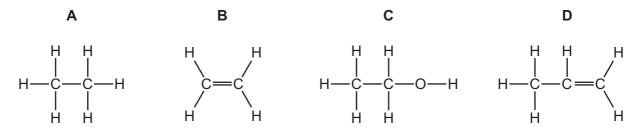
18 Which molecular structure shows an alcohol?



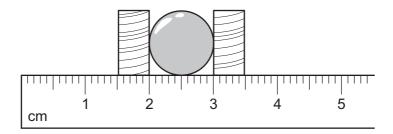
19 Which two substances are in the same homologous series?



**20** Which compound is the monomer used to make poly(ethene)?



- 21 What is the unit of weight?
  - A joule
  - **B** kilogram
  - **C** newton
  - **D** watt
- 22 A student uses two blocks and a ruler to find the radius of a ball.

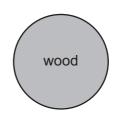


What is the radius of the ball?

- **A** 0.5 cm
- **B** 1.0 cm
- **C** 2.0 cm
- **D** 3.0 cm
- **23** Three balls made of different materials are dropped from a bench.



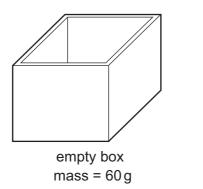


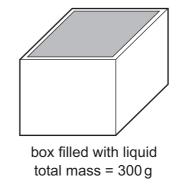


Which balls fall with the same acceleration?

- A aluminium and lead only
- **B** aluminium and wood only
- **C** lead and wood only
- D aluminium, lead and wood

**24** The diagrams show a rectangular box empty and filled with liquid.



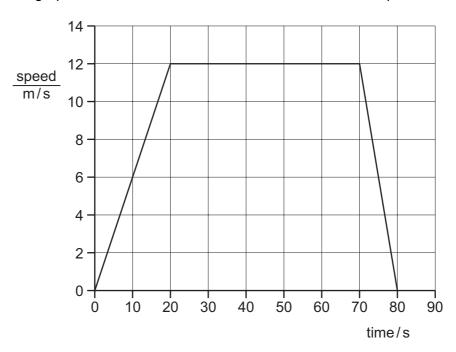


The box has a mass of  $60\,g$  when empty. When filled with a liquid, the total mass of the box and the liquid is  $300\,g$ . The density of the liquid is  $1.2\,g/cm^3$ .

What is the volume of the liquid in the box?

- **A** 50 cm<sup>3</sup>
- **B** 200 cm<sup>3</sup>
- **C** 250 cm<sup>3</sup>
- **D**  $300 \, \text{cm}^3$

25 The speed/time graph shown is for a bus as it travels from one bus stop to the next.



How far apart are the two bus stops?

- **A** 120 m
- **B** 600 m
- **C** 780 m
- **D** 960 m

26	Wh	ich property of a	an ob	ject <b>cannot</b> be	char	nged by a forc	e?	
	Α	its mass						
	В	its motion						
	С	its shape						
	D	its size						
27	Αc	ar starts from re	est ar	nd climbs a hill.				
								energy and 25 000 J of energy of ncreased by 100 000 J.
	Ηον	w much chemica	al en	ergy is used by	the o	car?		
	Α	125 000 J	В	225 000 J	С	300 000 J	D	325 000 J
28	Wh	ich energy sour	ce st	ores gravitation	al er	ergy?		
	Α	coal						
	В	geothermal						
	С	hydroelectric						
	D	nuclear						
29	Wh	ich process invo	olves	convection?				
	Α	bread toasting	unde	er a grill				
	В	heat energy pa	assin	g through a cop	per l	oar		
	С	heat from the S	Sun v	warming a road	surfa	ace		
	D	hot air rising to	the	top of a cool roo	om			
30	A rais 2	•	sap	lane mirror and	refle	ects. The angl	e betw	een the ray of light and the mirror
				ray of light				
				A	<b>7</b>		1	

What is the size of the angle of reflection?

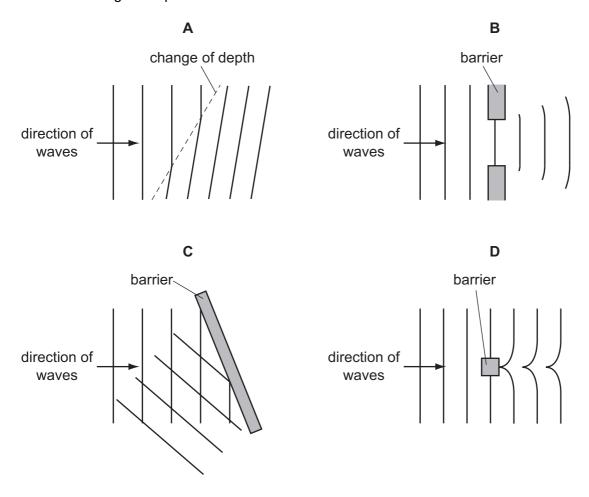
**A** 20°

**B** 70°

**C** 140°

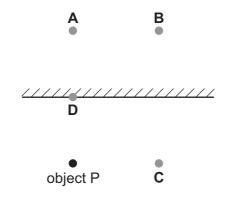
**D** 160°

31 Which diagram represents the reflection of water waves?



**32** A small object P is placed in front of a plane mirror as shown.

Where is the image of P formed?

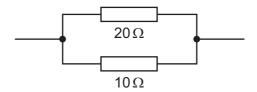


- 33 What is the approximate range of frequencies that can be heard by the human ear?
  - **A** 1 Hz to 1000 Hz
  - **B** 1 kHz to 1000 kHz
  - C 20 Hz to 20 000 Hz
  - **D** 20 kHz to 20 000 kHz

34 The live, neutral and earth wires inside a mains lead are each covered by plastic insulation.

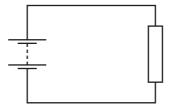
What is one purpose of the plastic?

- **A** It increases the resistance of the wires.
- **B** It makes the wires stronger.
- **C** It stops current passing between the wires.
- **D** It stops heat escaping from the wires.
- **35** A  $20\Omega$  resistor and a  $10\Omega$  resistor are connected in parallel.



What is their combined resistance?

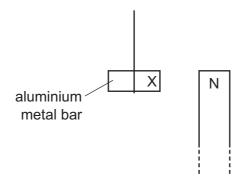
- **A** less than  $10\Omega$
- **B**  $10\Omega$
- $\mathbf{C}$  20 $\Omega$
- **D** more than  $20\Omega$
- **36** An electric circuit contains a battery connected to a resistor.



Which values of electromotive force (e.m.f.) and resistance will produce the largest current?

	e.m.f./V	resistance/ $\Omega$
Α	3	5
В	3	10
С	12	40
D	12	80

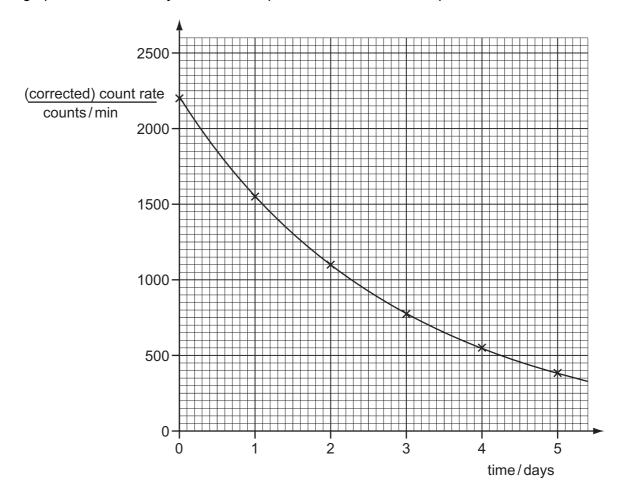
37 An aluminium bar is suspended near the north pole of a magnet.



What happens to the aluminium bar?

- **A** A north pole forms at X and the bar is attracted.
- **B** A north pole forms at X and the bar is repelled.
- **C** A south pole forms at X and the bar is attracted.
- **D** No pole forms at X and the bar is not affected.

38 The graph shows the decay curve for one particular radioactive isotope.



What is the half-life of this nuclide?

- **A** 1.0 day
- **B** 1.5 days
- **C** 2.0 days
- **D** 2.5 days

**39** A radium nuclide is represented by  $^{226}_{88}\,\mathrm{Ra}$  .

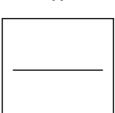
How many nucleons are there in this nuclide?

- **A** 88
- **B** 138
- **C** 226
- **D** 314

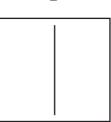
**40** The diagrams show patterns which you might see on the screen of a cathode-ray oscilloscope.

Which pattern would appear if an alternating potential difference is applied to the Y-plates, with the time-base switched off?

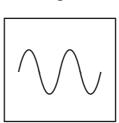
Α



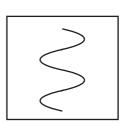
В



C



D



15

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DATA SHEET
The Periodic Table of the Elements

	0	4 <b>He</b> Helium	20 Neon 10 At Argom	84 <b>Kry</b> pton 36	131 <b>Xe</b> Xenon 54	Radon 86		175 <b>Lu</b> Lutetium 71	<b>Lr</b> Lawrencium 103
	IIΛ		19 Fluorine 9 35.5 <b>C 1</b>	80 <b>Br</b> Bromine 35	127 <b>I</b> lodine 53	At Astatine 85		173 <b>Yb</b> Ytterbium 70	Nobelium
	IN		16 Oxygen 8 32 Sulfur 16	Se Selenium 34	128 <b>Te</b> Tellurium	<b>Po</b> Polonium 84		169 <b>Tm</b> Thulium 69	Md Mendelevium 101
	>		14 Nitrogen 7 31 Phosphorus 15	75 <b>As</b> Arsenic 33	Sb Antimony 51	209 <b>Bi</b> Bismuth 83		167 <b>Er</b> Erbium 68	Fm Fermium 100
	ΛΙ		12 Carbon 6 Silicon 14 Silicon 14	73 Ge Germanium 32	<b>Sn</b> Tin	207 <b>Pb</b> Lead		165 <b>Ho</b> Holmium 67	Es Einsteinium 99
	≡		11 B Boron 5 27 A A Uminium	70 <b>Ga</b> Gallium 31	115 <b>In</b> Indium	204 <b>T t</b> Thallium 81		162 <b>Dy</b> Dysprosium 66	<b>Cf</b> Californium 98
				65 <b>Zn</b> Zinc 30	Cd Cadmium 48	201 <b>Hg</b> Mercury 80		159 <b>Tb</b> Terbium 65	Bk Berkelium 97
				64 Copper 29	108 <b>Ag</b> Silver 47	197 <b>Au</b> Gold		157 <b>Gd</b> Gadolinium 64	Cm Curium
Group				59 <b>N</b> ickel 28	106 <b>Pd</b> Palladium 46	195 <b>Pt</b> Platinum 78		152 <b>Eu</b> Europium 63	Am Americium 95
פֿ			,	59 <b>Coo</b> Cobalt 27	103 <b>Rh</b> Rhodium 45	192 <b>Ir</b> Iridium 77		Sm Samarium 62	
		T Hydrogen		56 <b>F.e.</b> Iron	Ru Ruthenium 44	190 <b>Os</b> Osmium 76		Pm Promethium 61	Neptunium
				Manganese	Tc Technetium	186 <b>Re</b> Rhenium 75		Neodymium 60	238 <b>U</b> Uranium 92
				Chromium 24	96 <b>Mo</b> Molybdenum 42	184 <b>W</b> Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91
				51 Vanadium 23	Niobium 41	181 <b>Ta</b> Tantalum 73		140 <b>Ce</b> Cerium 58	232 <b>Th</b> Thorium
				48 <b>Ti</b> Titanium	2r Zramium 40	178 <b>Hf</b> Hafnium			nic mass Ibol nic) number
				Scandium 21	89 <b>×</b>	139 <b>La</b> Lanthanum 57 *	227 <b>Ac</b> Actinium 89	l series eries	<ul> <li>a = relative atomic mass</li> <li>X = atomic symbol</li> <li>b = proton (atomic) number</li> </ul>
	=		Be Beryllium 4  24  Magnesium 12	40 <b>Ca</b> Calcium	Strontium	137 <b>Ba</b> Barium 56	226 <b>Ra</b> Radium 88	*58-71 Lanthanoid series 190-103 Actinoid series	а <b>х</b>
	_		7 Lithium 3 23 Na Sodium 11	39 Potassium	Rb Rubidium 37	Cs Caesium 55	Francium 87	*58-71 L	Key

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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