

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.



International Examinations

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						2		
1	Wh	nich meth	nod can be i	used to obta	ain crystals	from aqueou	s copp	per(II) sulfate?
	Α	diluting						
	В	dissolvi	ing					
	С	evapor	ating					
	D	stirring						
2	Wh	nich diagı	ram shows	the arrange	ment of par	ticles in a liqu	uid?	
			Α		В	С		D
3	Wh	nat is diffe	erent for iso	topes of the	e same elen	nent?		
	Α	numbe	r of electron	ıs				
	В	numbe	r of full shel	ls				
	С	numbe	r of nucleon	S				
	D	numbe	r of protons					
4	Sta	atements	1, 2 and 3	are about d	iamond and	graphite.		
		1	They are	different sol	id forms of	the same ele	ment.	
		2	They each	n conduct e	lectricity.			
		3	They have	e atoms tha	t form four e	equally strono	g bond	ls.
	Wh	nich state	ements are	correct?				
	Α	1 only	В	3 only	C ·	1 and 3	D	2 and 3

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5 Which compound has the largest relative molecular mass, M_r ?

 $\textbf{A} \quad \mathsf{CO}_2 \qquad \qquad \textbf{B} \quad \mathsf{NO}_2 \qquad \qquad \textbf{C} \quad \mathsf{SiO}_2 \qquad \qquad \textbf{D} \quad \mathsf{SO}_2$

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

colour	re	ed		(oran	ge	Ç	gree	n		l	olue		٧	iolet
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 Cu²⁺

B Fe²⁺

C Fe³⁺

D Zn²⁺

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?

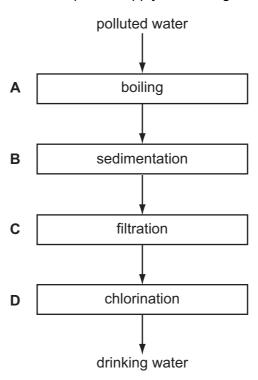
	chemical name	process X
Α	iron(II) oxide	oxidation
В	iron(II) oxide	reduction
С	iron(III) oxide	oxidation
D	iron(III) oxide	reduction

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.

				Х				

Which correctly describes X?

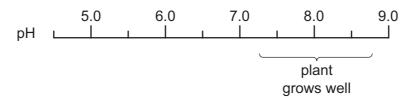
	density (g/dm³)	melting point (°C)
Α	0.97	98
В	1.96	119
С	3.12	-7
D	8.90	1455

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

A 1 and 2 only **B** 1, 2 and 3

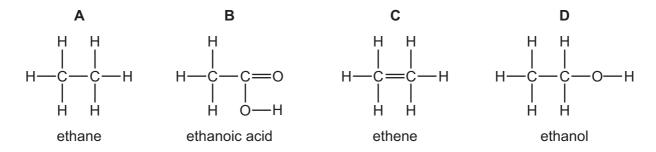
- 2 reaction between an acid and a carbonate
- 3 respiration
- 16 Three carbon-containing fuels are listed below.
 - 1 coal
 - 2 natural gas
 - 3 petroleum

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

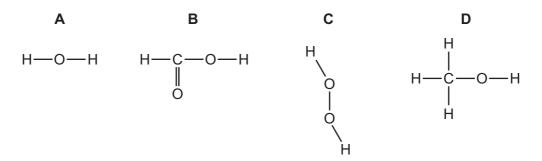
C 1 and 3 only D 2 and 3 only

	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

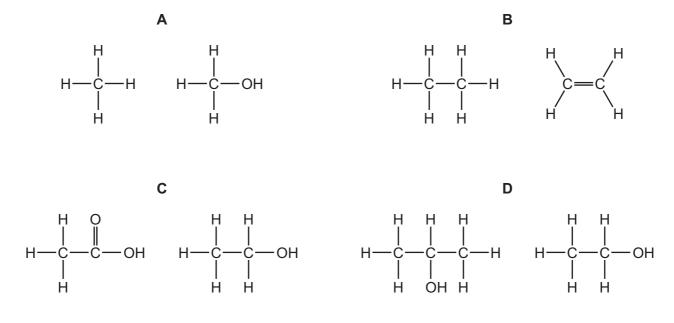
17 Which structure is **not** correct?



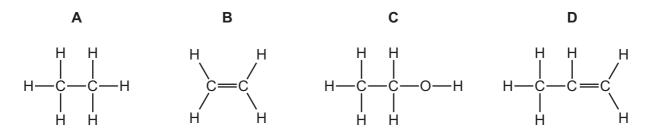
18 Which molecular structure shows an alcohol?



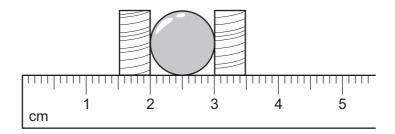
19 Which two substances are in the same homologous series?



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.

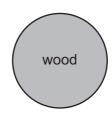


What is the radius of the ball?

- **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.



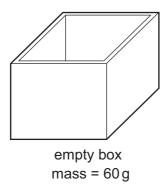


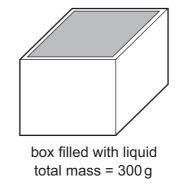


Which balls fall with the same acceleration?

- 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.



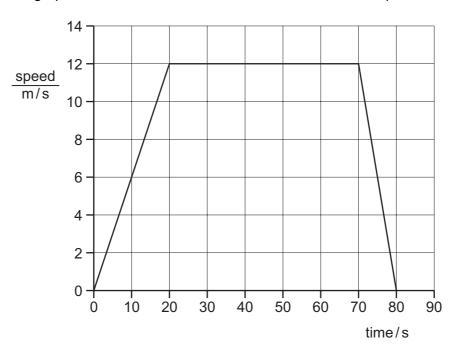


The box has a mass of $60\,g$ when empty. When filled with a liquid, the total mass of the box and the liquid is $300\,g$. The density of the liquid is $1.2\,g/cm^3$.

What is the volume of the liquid in the box?

- **A** 50 cm³
- **B** 200 cm³
- **C** 250 cm³
- **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	an ol	oject cannot be	e char	nged by a forc	e?	
	A	its mass						
	В	its motion						
	С	its shape						
	D	its size						
27	Αc	ar starts from re	est aı	nd climbs a hill.				
								energy and 25 000 J of energy of ncreased by 100 000 J.
	Ho	w much chemic	al en	ergy is used by	the c	ar?		
	Α	125 000 J	В	225 000 J	С	300 000 J	D	325 000 J
28	Wh	ich energy sou	rce st	tores gravitatio	nal en	ergy?		
	Α	coal						
	В	geothermal						
	С	hydroelectric						
	D	nuclear						
29	Wh	nich process inv	olves	convection?				
	Α	bread toasting	und	er a grill				
	В	heat energy p	assin	g through a co	pper b	oar		
	С	heat from the	Sun	warming a road	d surfa	ace		
	D	hot air rising to	o the	top of a cool ro	oom			
30		ay of light strike 20°.	es a p	olane mirror an	d refle	ects. The angl	e betw	een the ray of light and the mirror
				ray of light				
				7	7		T	

C 140°

D 160°

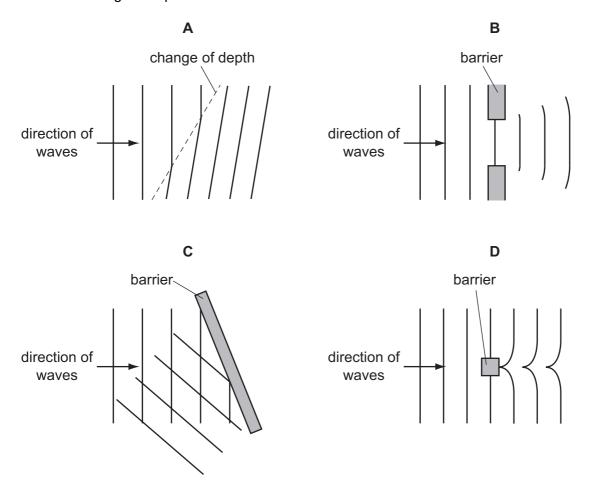
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B 70°

What is the size of the angle of reflection?

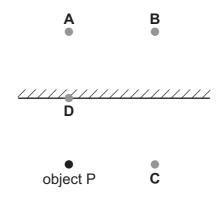
A 20°

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?

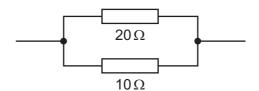


- 33 What is the approximate range of frequencies that can be heard by the human ear?
 - **A** 1 Hz to 1000 Hz
 - **B** 1 kHz to 1000 kHz
 - C 20 Hz to 20 000 Hz
 - **D** 20 kHz to 20 000 kHz

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

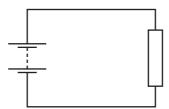
What is one purpose of the plastic?

- 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 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

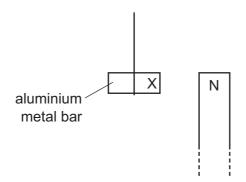
- **A** less than 10Ω
- **B** 10Ω
- \mathbf{C} 20 Ω
- **D** more than 20Ω
- **36** An electric circuit contains a battery connected to a resistor.



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

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

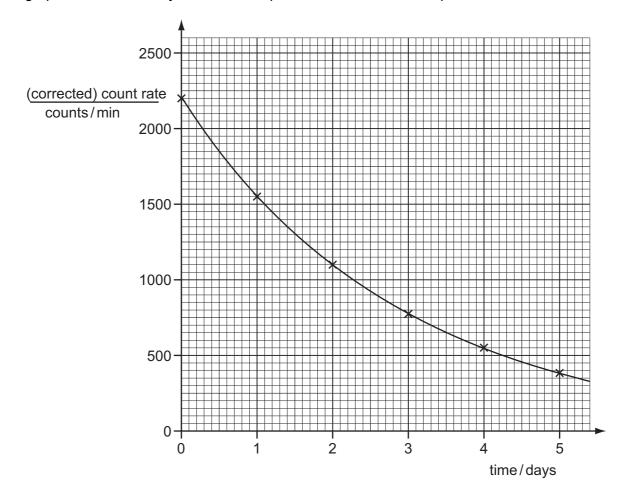
37 An aluminium bar is suspended near the north pole of a magnet.



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 $^{226}_{88} \, \text{Ra}$.

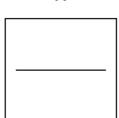
How many nucleons are there in this nuclide?

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

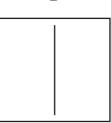
40 The diagrams show patterns which you might see on the screen of a cathode-ray oscilloscope.

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

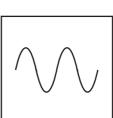
Α



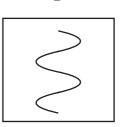
В



C



D



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DATA SHEET
The Periodic Table of the Elements

								Ğ	Group								
-	=											≡	<u> </u>	>	VI	NII/	0
							1 Hydrogen										4 He Helium
7 Li Lithium	Be Beryllium 4											11 Boron	12 Carbon 6	14 N Nitrogen 7	16 Oxygen	19 Fluorine	20 Ne Neon
23 Na Sodium	24 Mg Magnesium	Ē										27 A1 Aluminium 13	28 Si Silicon	31 P Phosphorus 15	32 S Sulfur 16	35.5 C1 Chlorine	40 Ar Argon
39 K Potassium	40 Ca Calcium	Scandium 21	48 T	51 V Vanadium 23	Cr Chromium 24	Manganese	56 Fe Iron	59 Co Cobalt	59 Nickel	64 Cu Copper 29	65 Zn Zinc	70 Ga Gallium 31	73 Ge Germanium 32	75 AS Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
Rb Rubidium 37	Strontium 38	89 ×	2r Zrcznium 40	Nobium A1	96 Mo Molybdenum 42	Tc Technetium 43	Ru Ruthenium 44			108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium	119 Sn Tin	122 Sb Antimony 51	Te Tellurium	127 T lodine	Xe Xenon
133 Cs caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium * 72	181 Ta Tartalum	184 W W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 I r Iridium	195 Pt Platinum 78	197 Au Gold	201 Hg Mercury 80	204 T t Thallium 81	207 Pb Lead	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Radon 86
Fr Francium 87	226 Ra Radium 88	227 AC Actinium															
*58-71 190-100	*58-71 Lanthanoid serie 190-103 Actinoid series	*58-71 Lanthanoid series 190-103 Actinoid series		140 Ce Cerium	141 Pr Praseodymium 59	144 Neodymiur 60	Pm n Promethium 61	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 Thullum 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
Key	а Х	a = relative atomic mass X = atomic symbol b = proton (atomic) number	mic mass abol nic) number	232 Th Thorium	Pa Protactinium 91	238 Unanium 92	Neptunium	Pu Plutonium 94	Am Americium	Cm Curium 96	Bk Berkelium 97	Celifornium		Fm Fermium	Md Mendelevium 101		Lr Lawrencium 103

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

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