

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS International General Certificate of Secondary Education

PHYSICAL SCIENCE 0652/13

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.

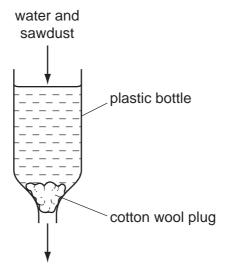
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.





1 Some water, contaminated with sawdust, is purified as shown.



Which purification method is this?

- **A** chlorination
- **B** dissolving
- **C** distillation
- **D** filtration
- 2 Statement 1: During an exothermic reaction, energy in the form of heat is taken in.

Statement 2: When fuel burns, energy in the form of heat is given out.

Which of the following is correct?

- A Both statements are true and statement 2 explains statement 1.
- **B** Both statements are true, but statement 2 does not explain statement 1.
- **C** Statement 1 is true but statement 2 is untrue.
- **D** Statement 2 is true but statement 1 is untrue.
- **3** Statements 1, 2 and 3 are about diamond and graphite.
 - 1 They are different solid forms of the same element.
 - 2 They each conduct electricity.
 - 3 They have atoms that form four equally strong bonds.

Which statements are correct?

A 1 only **B** 3 only **C** 1 and 3 **D** 2 and 3

4	What is	different	for	isotopes	of the	same	element?
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- A number of electrons
- B number of full shells
- C number of nucleons
- **D** number of protons

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

- $A CO_2$
- B NO₂
- C SiO₂
- D SO_2

6 Which could be the element helium at room temperature?

- A reactive gas
- B reactive liquid
- C unreactive gas
- **D** unreactive liquid

7 Magnesium reacts with acids to produce hydrogen gas.

Under which set of conditions is hydrogen produced most slowly?

	magnesium	magnesium acid	
Α	ribbon	concentrated	40
В	ribbon	dilute	20
С	powder	concentrated	40
D	powder	dilute	20

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

colour	rec	t	(oran	ge	Ç	gree	n		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

9 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⁺
- \mathbf{D} Zn^{2+}

10 In which states of matter do particles vibrate about a fixed position?

- A gas state only
- B liquid state only
- C solid state only
- D gas, liquid and solid states

11 Metal X has to be extracted from its ores using electrolysis.

In which position in the reactivity series is X most likely to be found?

sodium

Α

zinc

В

iron С

copper

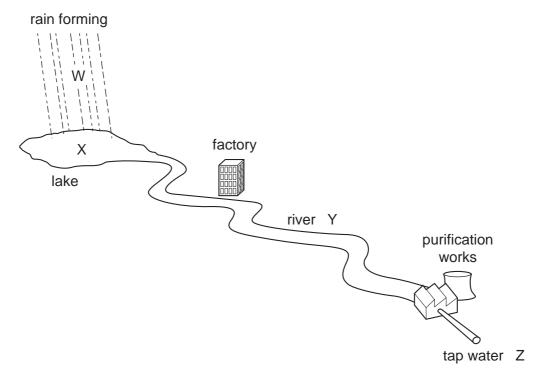
D

12 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	✓

13 The diagram shows part of a water supply.



Which statement is **not** correct?

- A Bacteria have been removed from water at Z.
- **B** Dissolved carbon dioxide is present in water at W.
- C Dissolved solids are absent from water at X.
- **D** Water at W is purer than water at Y.
- **14** The word equation represents the complete combustion of methane.

methane + oxygen
$$\rightarrow$$
 gas X + water

What is gas X?

- A carbon dioxide
- **B** hydrogen
- C nitrogen
- **D** sulfur dioxide
- 15 Lime is used to treat acidic soil because it is a base.

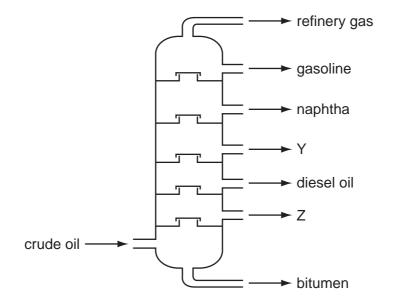
What is the pH of the solution formed when lime is added to water?

- **A** 1
- **B** 4
- **C** 7
- **D** 10

16 The diagram shows the structure of a molecule.

What is the name of this compound?

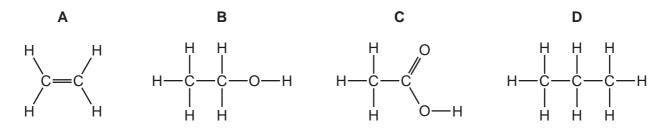
- A propane
- B propanoic acid
- **C** propanol
- **D** propene
- 17 The diagram shows the fractional distillation of petroleum.



Which row shows the correct uses of the fractions Y and Z?

	Y	Z
Α	fuel for cars	waxes and polishes
В	fuel for cars	mending roads
С	fuel for jets	waxes and polishes
D	fuel for jets	mending roads

18 Which compound belongs to the same homologous series as ethane?

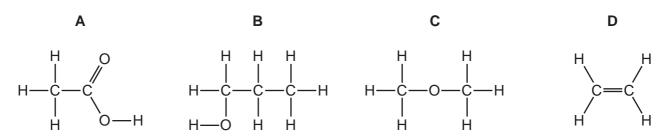


19 A hydrocarbon X burns but does **not** catalytically react with steam.

Which description of X is correct?

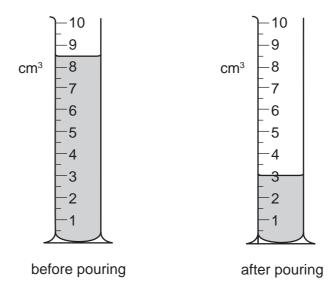
	name	number of single bonds in molecule	number of double bonds in molecule
Α	ethane	6	1
В	ethane	7	0
С	ethene	6	1
D	ethene	7	0

20 Which molecular structure shows an alcohol?



21 Some water is poured from a measuring cylinder.

The diagrams show the measuring cylinder before and after the water was poured from it.

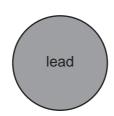


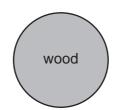
What is the volume of the water which was poured out?

- **A** $3.0 \, \text{cm}^3$
- **B** 5.5 cm³
- **C** 6.5 cm³
- **D** $8.5\,\text{cm}^3$

22 Three balls made of different materials are dropped from a bench.



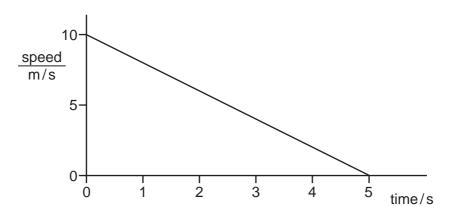




Which balls fall with the same acceleration?

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

23 The graph shows the speed of a car changing while the driver uses the brakes to stop.



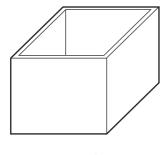
How far did the car travel in five seconds?

- **A** 5 m
- **B** 10 m
- **C** 25 m
- **D** 50 m

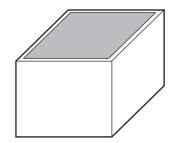
24 What is the unit of weight?

- A joule
- **B** kilogram
- C newton
- **D** watt

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



empty box mass = 120 g



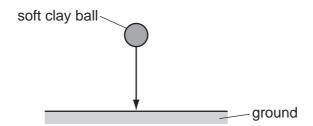
box filled with liquid total mass = 600 g

The box has a mass of 120 g when empty. When filled with a liquid, the total mass of the box and the liquid is $600\,g$. The density of the liquid is $1.2\,g/cm^3$.

What is the volume of the liquid in the box?

- **A** 600 cm³
- **B** 500 cm³
- **C** 400 cm³
- **D** 100 cm³

- **26** Which property of an object **cannot** be changed by a force?
 - A its mass
 - B its motion
 - C its shape
 - **D** its size
- 27 A ball made of soft clay is dropped and hits the ground. It does not bounce.



What are the energy changes that take place as the ball drops and hits the ground?

- **A** energy of motion \rightarrow gravitational \rightarrow thermal
- **B** energy of motion \rightarrow thermal \rightarrow gravitational
- \mathbf{C} gravitational \rightarrow energy of motion \rightarrow thermal
- $\textbf{D} \quad \text{gravitational} \rightarrow \text{thermal} \rightarrow \text{energy of motion}$
- 28 A radio uses a battery as its source of energy.

Which energy changes take place when the radio is being used?

- A chemical to electrical to sound
- B electrical to chemical to sound
- **C** electrical to sound to chemical
- **D** sound to chemical to electrical
- Which row shows what happens to the temperature of a solid as it melts, and to the temperature of a liquid as it boils?

	temperature of a solid as it melts	temperature of a liquid as it boils
Α	increases	increases
В	no change	increases
С	increases	no change
D	no change	no change

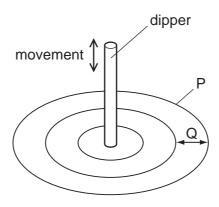
30 The table lists four physical properties P, Q, R and S of some substances and states how each property varies as the temperature rises.

	physical property of substance	variation as temperature rises
Р	pressure of helium	increases
Q	volume of mercury	increases
R	radioactivity of uranium-238	does not change
S	resistance of silicon	decreases

Which properties could be used as the basis for the measurement of temperature?

- A P, Q and R
- B P, Q and S
- C P, R and S
- **D** Q, R and S

31 Circular waves can be made on the surface of water by moving a dipper up and down.



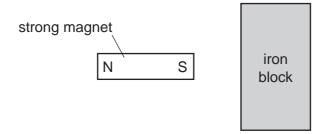
What does the line P represent and what is the distance Q called?

	line P	distance Q
Α	amplitude	wavefront
В	wavefront	amplitude
С	wavefront	wavelength
D	wavelength	amplitude

32 Which row shows how the speed of infra-red waves and the speed of X-rays compare with the speed of light *in vacuo* (in a vacuum)?

	speed of infra-red waves	speed of X-rays
Α	greater than light	less than light
В	the same as light	greater than light
С	less than light	greater than light
D	the same as light	the same as light

33 A strong permanent magnet is placed close to a large block of iron, as shown in the diagram.

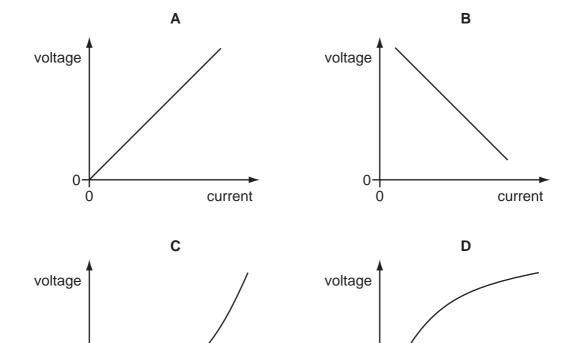


The iron block becomes an induced magnet.

What is the arrangement of its poles?

Α	В	С			D		
N	S						
			N	S	S	N	
S	N						

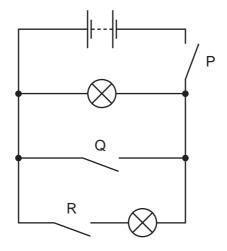
34 Which diagram is the voltage/current graph for a metallic conductor at constant temperature?



35 The diagram shows a circuit with three switches P, Q and R.

current

0

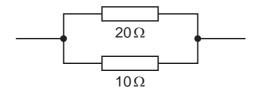


Which switches must be closed so that both lamps will light?

- A P and Q only
- B P and R only
- C Q and R only
- D P, Q and R

current

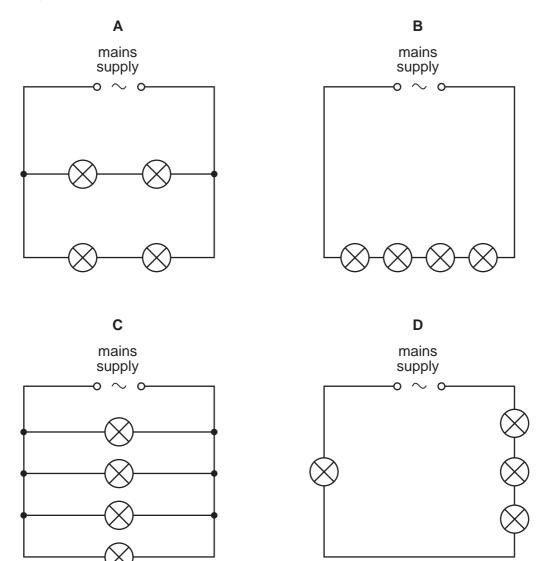
36 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

- **A** less than 10Ω
- **B** 10Ω
- \mathbf{C} 20 Ω
- **D** more than 20Ω
- **37** Four lamps are connected to a mains supply in a house. If one lamp fails, the other three lamps will continue to operate.

Which diagram shows how the lamps should be connected?

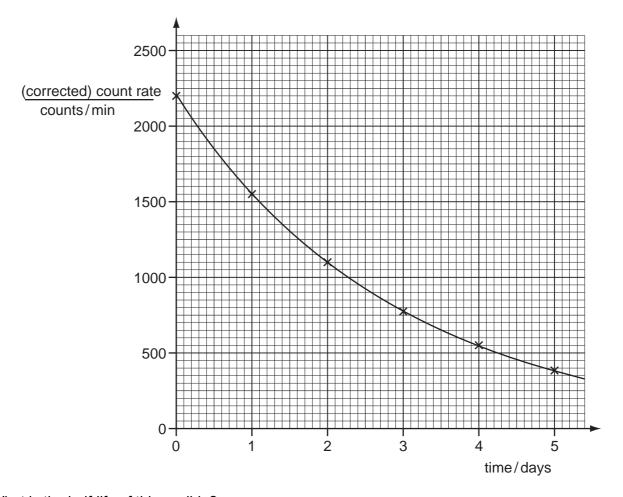


38 When a tungsten filament is heated in a vacuum, thermionic emission occurs.

Which particles are given off during thermionic emission?

- A alpha-particles
- **B** electrons
- C ions
- **D** protons

39 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

40 The table gives information about an atom.

number of protons	10
number of neutrons	12
number of electrons	10

What is its nucleon number?

- **A** 10
- **B** 12
- **C** 22
- **D** 32

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DATA SHEET
The Periodic Table of the Elements

	0	4 He Helium	Neon 10 Neon 10 Argon 18	84 Krypton 36	131 Xe Xenon Xenon 54	Rn Radon 86		175 Lu Lutetium 71	Lr Lawrencium 103
Group	II/		19 Fluorine 9 35.5 C1 Chlorine	80 Br Bromine 35	127	At Astatine 85		173 Yb Ytterbium 70	Nobelium 102
	IN		16 Oxygen 8 32 S Suffur 16	Selenium 34	128 Te Telurium 52	Po Polonium 84		169 Tm Thulium 69	Md Mendelevium 101
	>		14 Nitrogen 7 31 31 Phosphorus 15	AS As Arsenic	Sb Antimony 51	209 Bi Bismuth		167 Er Erbium 68	Fm Fermium
	Ν		Carbon 6 Carbon 8 Silicon 14	73 Ge Germanium	Sn Tin	207 Pb Lead		165 Ho Holmium 67	ES Einsteinium 99
			11 B Boron 5 27 A 1 AUminium	70 Ga Gallium 31	115 n Indium 49	204 T t Thallium 81		162 Dy Dysprosium 66	Cf Californium 98
				65 Zn Zinc 30	112 Cd Cadmium 48	201 Hg Mercury 80		159 Tb Terbium 65	BK Berkeium 97
				64 Copper 29	108 Ag Silver 47	197 Au Gold		157 Gd Gadolinium 64	Curium 96
				59 N ickel 28	106 Pd Palladium 46	195 Pt Platinum 78		152 Eu Europium 63	Am Americium 95
			,	59 Cobalt	103 Rh Rhodium 45	192 Iridium 77		Samarium 62	Pu Plutonium
		T Hydrogen		56 Fe Iron	Ru Ruthenium 44	190 Os Osmium 76		Pm Promethium 61	Neptunium
				Mn Manganese 25	Tc Technetium 43	186 Re Rhenium 75		Neodymium 60	238 U Uranium
				52 Cr Chromium 24	96 Mo Motybdenum 42	184 W Tungsten 74		Pr Praseodymium 59	Pa Protactinium 91
				51 Vanadium 23	93 Nb Niobium 41	181 Ta Tantalum 73		140 Cer ium 58	232 Th Thorium
				48 Ti Titanium 22	91 Zr Ziroonium 40	178 Ha fnium * 72			nic mass Ibol nic) number
				Scandium 21	89 × Yttrium 39	139 La Lanthanum 57 *	AC Actinium 89	d series series	a = relative atomic mass X = atomic symbol b = proton (atomic) number
	=		9 Be Beryllium 4 24 Mg Magnesium 12	40 Ca Calcium	Strontium	137 Ba Barium 56	226 Ra Radium 88	*58-71 Lanthanoid series	v × v
	_		7 Lithium 3 23 Na Sodium 11	39 K	Rb Rubidium	133 CS Caesium 55	Fr Francium 87	*58-71 L	Key

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