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

### PHYSICAL SCIENCE

0652/01

Paper 1 Multiple Choice

October/November 2005

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.

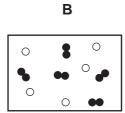
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

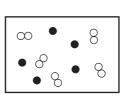
Any rough working should be done in this booklet.

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

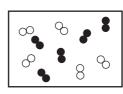
- 1 Which method would be most suitable for obtaining a sample of pure water from aqueous sodium chloride?
  - **A** chromatography
  - **B** distillation
  - C electrolysis
  - **D** precipitation
- 2 A gaseous mixture contains hydrogen and helium.

Which diagram best represents this mixture?

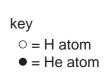




C



D



- 3 Which element is a metal?
  - A barium, Ba
  - B helium, He
  - C selenium, Se
  - **D** tellurium, Te
- 4 What are the nucleon numbers for carbon and magnesium?

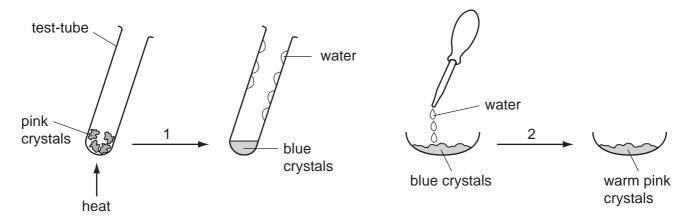
	carbon	magnesium
Α	6	12
В	6	24
С	12	12
D	12	24

## 5 A model of a molecule is shown.



Which molecule could this be?

- A ammonia
- **B** hydrogen chloride
- C methane
- **D** water
- 6 The diagrams show the changes that occur in an experiment on some pink crystals.

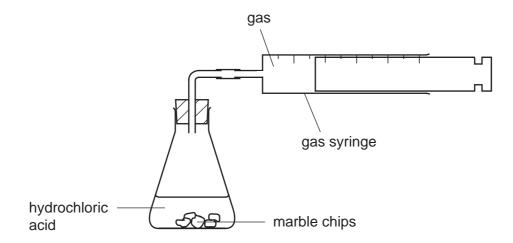


Which changes are exothermic?

- A 1 only
- B 2 only
- C both 1 and 2
- **D** neither 1 nor 2

7 A 1g sample of marble chips reacts with an excess of 1 mol/dm³ hydrochloric acid, as shown.

A measured volume of gas is collected in 60 seconds.



The experiment is repeated using  $2\,\mathrm{g}$  of marble chips and an excess of  $2\,\mathrm{mol}\,/\,\mathrm{dm}^3$  hydrochloric acid.

How long does it take for the **same** volume of gas to be collected?

- **A** 30 s
- **B** 60 s
- **C** 120 s
- **D** 240 s

8 Which reaction is an example of neutralisation?

- **A**  $KMnO_4(s) + H_2O(I) \rightarrow KMnO_4(aq)$
- **B**  $2Na(s) + Cl_2(g) \rightarrow 2NaCl(s)$
- **C** PbBr<sub>2</sub>(I)  $\rightarrow$  Pb(s) + Br<sub>2</sub>(g)
- **D**  $H_2SO_4(aq) + CuO(s) \rightarrow CuSO_4(aq) + H_2O(l)$

9 An incomplete equation is given.

What is X?

- A hydrogen
- **B** oxygen
- C sulphur dioxide
- **D** water

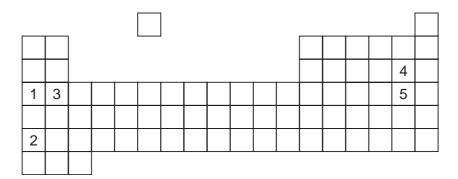
10 The table shows the results of two experiments on an aqueous solution containing two cations.

	experiment 1	experiment 2
reagent	add an excess of NaOH (aq)	add an excess of NH <sub>3</sub> (aq)
result	pale blue precipitate in a colourless solution	white precipitate in a dark blue solution

What are the cations?

- **A**  $Al^{3+}$  and  $Cu^{2+}$
- **B**  $Al^{3+}$  and  $Fe^{2+}$
- C Ca<sup>2+</sup> and Cu<sup>2+</sup>
- **D** Ca<sup>2+</sup> and Fe<sup>2+</sup>

11 Which pair of numbered elements combine together to form an ionic compound?



- **A** 1 and 2
- **B** 2 and 3
- **C** 3 and 4
- **D** 4 and 5

12 Which type of element is found on the left-hand side of the Periodic Table?

- A halogen
- **B** metal
- C noble gas
- **D** non-metal

**13** A yellow-green element **X** reacts with an aqueous solution of a potassium salt. A red-brown element **Y** is formed.

What are **X** and **Y**?

	Х	Y
Α	bromine	chlorine
В	bromine	iodine
С	chlorine	bromine
D	chlorine	iodine

- 14 Which property do all metals have?
  - A They are hard.
  - **B** They are less dense than water.
  - **C** They are very reactive.
  - **D** They conduct electricity.
- **15** Bauxite and haematite are important ores.

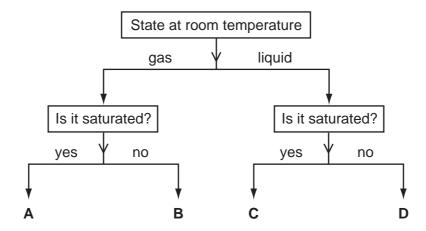
Which metals do they contain?

	bauxite	haematite
Α	A <i>l</i>	Cu
В	Al	Fe
С	Fe	Cu
D	Cu	A <i>l</i>

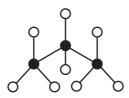
- **16** Which process is used in water treatment to kill bacteria?
  - A adding lime
  - **B** chlorination
  - **C** crystallisation
  - **D** filtration

17 Which structure represents a carboxylic acid?

18 In the diagram, which substance A, B, C or D could be methane?



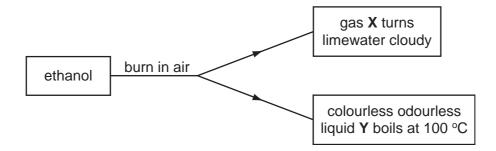
19 The diagram shows a model of propane, a member of the alkane series of hydrocarbons.



Which of the following is also a member of the alkane homologous series?

- A  $C_3H_6$
- $\mathbf{B}$   $C_4H_8$
- ${f C} {\ \ \, \, } {\ \ \, } {\ \ \, } {\ \ \, } {\ \ \, } {\ \ \, } {\ \ \, } {\ \ \, } {\ \ \, }$
- **D**  $C_6H_{10}$

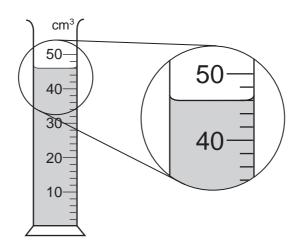
**20** The diagram gives information about the burning of ethanol.



What are X and Y?

	X	Y
Α	carbon dioxide	ethanoic acid
В	carbon dioxide	water
С	carbon monoxide	ethanoic acid
D	carbon monoxide	water

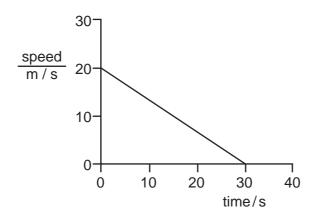
21 A measuring cylinder is used to measure the volume of a liquid.



What is the volume of the liquid?

- $\mathbf{A}$  43 cm<sup>3</sup>
- **B** 46 cm<sup>3</sup>
- **C** 48 cm<sup>3</sup>
- $\mathbf{D}$  54 cm<sup>3</sup>

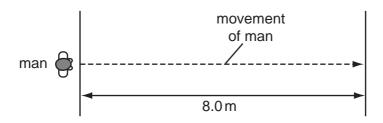
22 The graph represents part of the journey of a car.



What distance does the car travel during this part of the journey?

- **A** 150 m
- **B** 300 m
- **C** 600 m
- **D** 1200 m

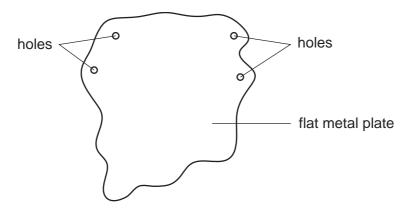
23 A man crosses a road 8.0 m wide at a speed of 2.0 m/s.



How long does the man take to cross the road?

- **A** 4.0 s
- **B** 6.0 s
- **C** 10s
- **D** 16s

24 The diagram shows a flat metal plate that may be hung from a nail so that it can rotate about any of four holes.



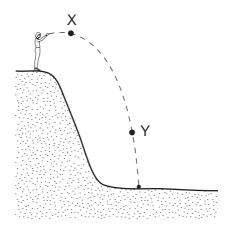
What is the smallest number of holes from which the flat metal plate should be hung in order to find its centre of gravity?

- **A** 1
- **B** 2
- **C** 3
- **D** 4

25 Which type of power station does **not** use steam from boiling water to generate electricity?

- **A** geothermal
- **B** hydroelectric
- C nuclear
- **D** oil-fired

**26** A man standing at the top of a cliff throws a stone.



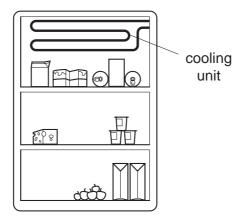
Which forms of energy does the stone have at X and at Y?

	energy at X	energy at Y
Α	gravitational only	energy of motion only
В	energy of motion only	gravitational only
С	gravitational only	gravitational and energy of motion
D	gravitational and energy of motion	gravitational and energy of motion

27 Which substance is a liquid at a room temperature of 25 °C?

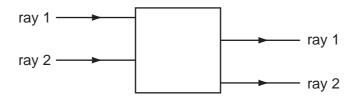
substance	melting point/°C	boiling point/°C
Α	-218	-183
В	<b>–</b> 39	357
С	44	280
D	119	444

**28** The diagram shows a cooling unit in a refrigerator.



Why is the cooling unit placed at the top?

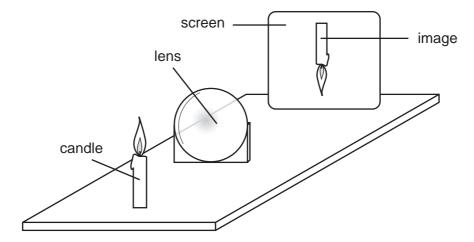
- A Cold air falls and warm air is displaced upwards.
- **B** Cold air is a bad conductor so heat is not conducted into the refrigerator.
- **C** Cold air is a good conductor so heat is conducted out of the refrigerator.
- **D** Cold air stops at the top and so prevents convection.
- 29 Rays of light enter and leave a box.



What could be inside the box to make the rays behave as shown?

- A a converging lens
- **B** a parallel-sided glass block
- C a plane mirror
- **D** a triangular prism

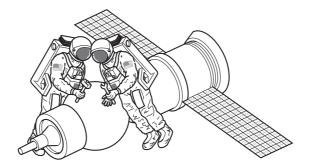
**30** A thin converging lens is used to produce on a screen a focused image of a candle.



The screen and the lens are moved back and forth and various focused images are produced on the screen.

## Which statement is always true?

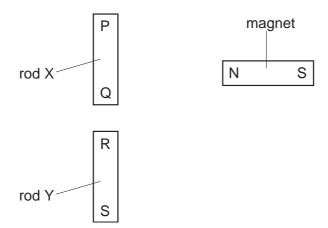
- A The image is at the principal focus (focal point) of the lens.
- **B** The image is bigger than the object.
- **C** The image is closer to the lens than the object is.
- **D** The image is inverted.
- **31** Two astronauts without radios can only communicate in space if their helmets are touching. There is no air in space.



#### What does this show about sound?

	through a solid	through a vacuum
Α	can travel	can travel
В	can travel	cannot travel
С	cannot travel	can travel
D	cannot travel	cannot travel

## **32** Two rods X and Y look the same.



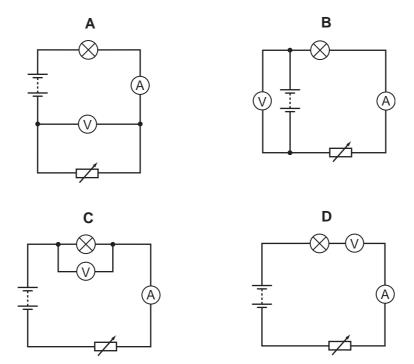
The N pole of a magnet is brought close, in turn, to each end of both rods. The results of these four actions are shown in the table.

end tested	result
Р	attraction
Q	attraction
R	attraction
S	repulsion

Which of the rods is a magnet?

- A neither of the rods
- B both of the rods
- C rod X only
- **D** rod Y only

33 Which circuit should be used to find the resistance of a lamp?

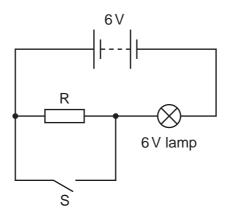


**34** The table shows the voltage and current ratings for four electric heaters.

Which heater has the least resistance?

	voltage/V	current/A
Α	110	5.0
В	110	10
С	230	5.0
D	230	10

35 When the circuit shown is connected with switch S open, the 6V lamp glows.



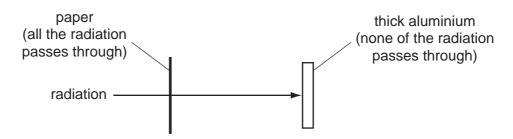
What happens to the brightness of the lamp when switch S is closed?

- A It becomes brighter.
- **B** It remains the same.
- C It becomes dimmer.
- **D** It goes off.
- **36** Why are the electric lamps in a house lighting circuit normally connected in parallel?
  - A The current in every circuit must be the same.
  - **B** The lamps are always switched on and off at the same time.
  - **C** The voltage across each lamp must be the mains voltage.
  - **D** When one of the lamps blows, all the others go out.
- **37** Charged particles are emitted from the cathode of an oscilloscope.

What is the name and the charge of these particles?

	name of particles	charge of particles
Α	electrons	negative
В	electrons	positive
С	protons	negative
D	protons	positive

**38** A radioactive source emits radiation which can pass through a sheet of paper but not through thick aluminium.



What does this show about the radiation?

- **A** It is alpha-particles.
- **B** It is beta-particles.
- **C** It is gamma-rays.
- **D** It is a mixture of alpha-particles and gamma-rays.
- **39** An unstable nucleus has 145 neutrons and 92 protons. It emits a beta-particle.

How many neutrons and protons does it have after this?

	neutrons	protons
Α	144	92
В	144	93
С	145	91
D	145	93

- **40** Which particles are found in the nucleus of an atom?
  - A neutrons and protons only
  - **B** neutrons only
  - C protons and electrons only
  - **D** protons, electrons and neutrons

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DATA SHEET
The Periodic Table of the Elements

	1							1	
	0	4 <b>He</b> Helium	20 <b>Ne</b> Neon	40 <b>Ar</b> Argon	84 <b>K</b> rypton 36	131 <b>Xe</b> Xenon Xenon 54	Radon 86		175 <b>Lu</b> Lutetium
	<b>=</b>		19 <b>T</b> Fluorine	35.5 <b>C1</b> Chlorine	80 <b>Br</b> Bromine 35	127 <b>I</b> lodine	At Astatine 85		173 <b>Yb</b> Ytterbium
	>		16 O Oxygen	32 <b>S</b> Sulphur 16	79 <b>Se</b> Selenium 34	128 <b>Te</b> Tellurium 52	<b>Po</b> Polonium 84		169 <b>Tm</b> Thulium
	>		14 Nitrogen 7	31 <b>P</b> Phosphorus 15	75 <b>AS</b> Arsenic 33	Sb Antimony 51	209 <b>Bi</b> Bismuth 83		167 <b>Er</b> Erbium
	≥		12 Carbon 6	28 <b>Si</b> Silicon	73 <b>Ge</b> Germanium 32	Sn Tin 50	207 <b>Pb</b> Lead		165 <b>H</b> Olmium
	≡		11 Boron 5	27 <b>A 1</b> Aluminium 13	70 <b>Ga</b> Gallium 31	115 <b>In</b> Indium 49	204 <b>T 1</b> Thallium		162 <b>Dy</b> Dysprosium
					65 <b>Zn</b> Zinc 30	Cadmium 48	201 <b>Hg</b> Mercury 80		159 <b>Tb</b> Terbium
					64 Copper	108 <b>Ag</b> Silver 47	197 <b>Au</b> Gold		157 <b>Gd</b> Gadolinium
Group					59 Nickel	106 <b>Pd</b> Palladium 46	195 <b>Pt</b> Platinum 78		152 <b>Eu</b> Europium
G			1		59 <b>Co</b> Cobalt	103 <b>Rh</b> Rhodium 45	192 <b>Ir</b> Iridium		150 <b>Sm</b> Samarium
		T Hydrogen			56 Fe	Ruthenium	190 <b>Os</b> Osmium 76		<b>Pm</b> Promethium
					55 Mn Manganese 25	Tc Technetium 43	186 <b>Re</b> Rhenium 75		144 <b>N</b> eodymium
					Chromium	96 Mo Molybdenum 42	184 <b>W</b> Tungsten 74		141 <b>Pr</b> Praseodymium
					51 <b>V</b> Vanadium 23	93 <b>Nb</b> Niobium	181 <b>Ta</b> Tantalum		140 <b>Ce</b>
					48 <b>T</b> Titanium	2r Zirconium 40	178 <b>#f</b> Hafnium		1
					Scandium 21	89 × ttrium 39	139 <b>La</b> Lanthanum 57	Ac Actinium 89	d series eries
	=		Be Beryllium 4	24 <b>Mg</b> Magnesium	40 <b>Ca</b> Calcium	Strontium 38	137 <b>Ba</b> Barium 56	226 <b>Ra</b> Radium	*58-71 Lanthanoid series 90-103 Actinoid series
	_		7 <b>L i</b> Lithium	23 <b>Na</b> Sodium	39 <b>K</b> Potassium 19	85 <b>Rb</b> Rubidium 37	133 Csesium 55	<b>Fr</b> Francium 87	*58-71 L

175 <b>Lu</b> Lutetium 71	<b>Lr</b> Lawrencium 103
173 <b>Yb</b> Ytterbium 70	Nobelium 102
169 <b>Tm</b> Thulium 69	Md Mendelevium 101
167 <b>Er</b> Erbium 68	Fm Fermium 100
165 <b>Ho</b> Holmium 67	Es Einsteinium 99
162 Dy Dysprosium 66	Cf Californium 98
159 <b>Tb</b> Terbium 65	<b>BK</b> Berkelium 97
157 <b>Gd</b> Gadolinium 64	<b>Cm</b> Curium
152 <b>Eu</b> Europium 63	Am Americium 95
Samarium 62	<b>Pu</b> Plutonium 94
Pm Promethium 61	Neptunium
Neodymium 60	238 <b>U</b> Uranium 92
Praseodymium 59	Pa Protactinium 91
140 <b>Ce</b> Cerium 58	232 <b>Th</b> Thorium 90

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

b = proton (atomic) number

Key

a = relative atomic massX = atomic symbol