



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/12**

Paper 1 Multiple Choice

**October/November 2011**

**45 minutes**

Additional Materials: Multiple Choice Answer Sheet  
Soft clean eraser  
Soft pencil (type B or HB is recommended)

\* 6 4 6 3 8 0 8 7 1 4 \*

**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.

This document consists of **14** printed pages and **2** blank pages.



1 Which leaf tissue has specialised cells that surround stomata?

- A epidermis
- B palisade mesophyll
- C phloem
- D xylem

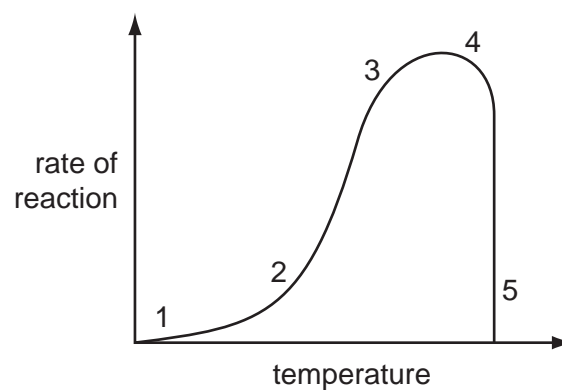
2 Which parts of a cell control its activities and control what enters and leaves it?

	controls cell's activities	controls what enters and leaves the cell
<b>A</b>	chloroplast	cell surface membrane
<b>B</b>	chloroplast	cell wall
<b>C</b>	nucleus	cell surface membrane
<b>D</b>	nucleus	cell wall

3 Which part of a plant cell is made of cellulose?

- A cell membrane
- B cell wall
- C chloroplast
- D nucleus

4 The graph shows the effect of temperature on the rate of an enzyme-controlled reaction.



Where on the graph has all the enzyme been denatured?

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

- 5 When a leaf is photosynthesising, in which direction do gases diffuse through the stomata?

	carbon dioxide	oxygen
<b>A</b>	in	in
<b>B</b>	in	out
<b>C</b>	out	in
<b>D</b>	out	out

- 6 What happens during digestion?

	large pieces of food are broken into small pieces	large molecules are broken into small molecules
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 7 Oxygenated blood returns to the heart from the lungs in vessel X and leaves the heart to circulate around the body in vessel Y.

What are X and Y?

	X	Y
<b>A</b>	aorta	pulmonary vein
<b>B</b>	pulmonary artery	vena cava
<b>C</b>	pulmonary vein	aorta
<b>D</b>	vena cava	pulmonary artery

- 8 Which method of family planning is also likely to reduce the risk of the spread of syphilis?

- A** condom
- B** intra-uterine device (IUD)
- C** pill
- D** sterilisation

4

- 9 A species of animal reproduces both sexually and asexually.

Which offspring will be clones?

	offspring from sexual reproduction	offspring from asexual reproduction
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

- 10 The table shows the level of alcohol in a person's blood after drinking two litres of beer.

time after drinking beer (hours)	alcohol in the blood (grams/dm <sup>3</sup> )
1	7
2	5
3	3
4	0

How long will it be (in hours) before the person's reaction time returns to normal?

- A** 0 to 1      **B** 1 to 2      **C** 2 to 3      **D** 3 to 4
- 11 The diagram shows a food chain.



Which types of energy are represented by the black arrows and by the white arrows?

	black arrows	white arrows
<b>A</b>	chemical	heat
<b>B</b>	chemical	light
<b>C</b>	heat	chemical
<b>D</b>	light	chemical

12 Which process reduces soil erosion on hilly ground?

- A cutting down the trees
- B increasing the number of grazing animals
- C ploughing up and down the hilly ground
- D terracing the hilly ground

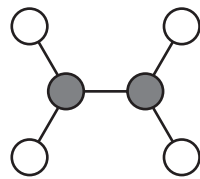
13 Albino humans cannot make any pigment in their skin.

A pale-skinned student, who is **not** an albino, sits in the sun on a number of days. The student's skin becomes suntanned (darker).

What causes this suntanning to happen?

- A the environment and the student's albino alleles
- B the environment and the student's non-albino alleles
- C the environment only
- D the student's genes only

14 A model of a molecule is shown.



key

○ = hydrogen

● = nitrogen

Which description and formula are correct for this molecule?

	description	formula
<b>A</b>	compound	$\text{NH}_2$
<b>B</b>	compound	$\text{N}_2\text{H}_4$
<b>C</b>	mixture	$\text{NH}_2$
<b>D</b>	mixture	$\text{N}_2\text{H}_4$

6

15 Element X has a nucleon number of 40.

The electron arrangement of element X is 2,8,8.

Which statements about element X are correct?

- 1 It has 40 neutrons in its nucleus.
- 2 It has 2 electrons in its outer shell.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.

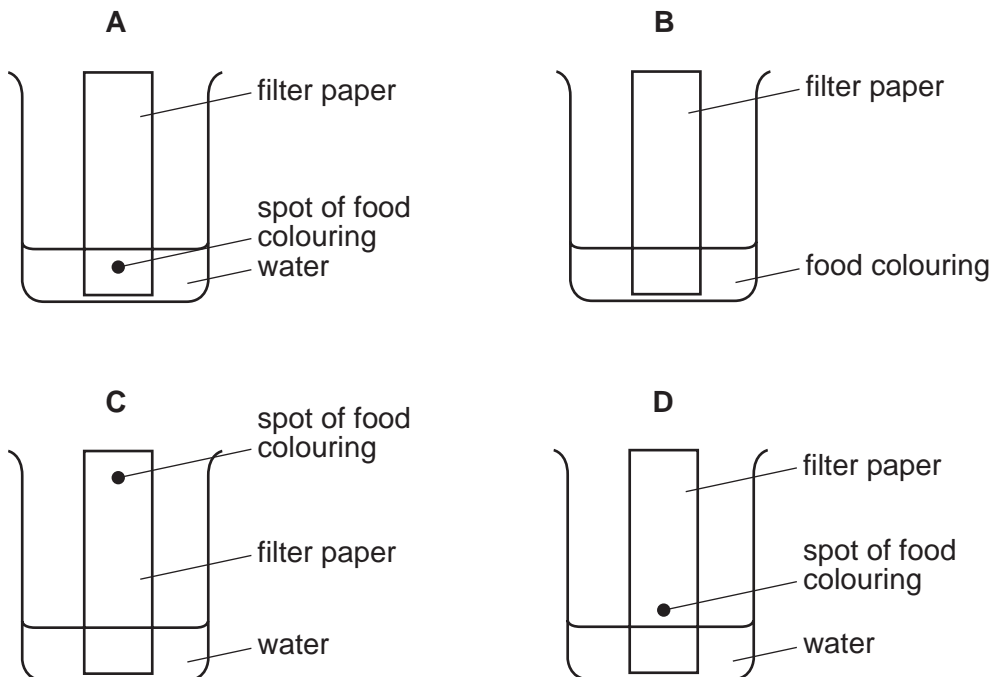
**A** 1 and 2

**B** 1 and 3

**C** 2 and 4

**D** 3 and 4

16 Which diagram shows how a mixture of dyes in a food colouring are separated?



17 Sulfur dioxide is formed as a pollutant when fossil fuels are burned.

Which properties does sulfur dioxide have?

	toxic	acidic	corrosive
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	✓	x	x
<b>D</b>	x	x	x

18 Which equation is correctly balanced?

- A  $2Al + 3Cl_2 \rightarrow 2AlCl_3$
- B  $Fe_2O_3 + 3C \rightarrow 2Fe + 3CO_2$
- C  $KCl + Br_2 \rightarrow KBr + Cl_2$
- D  $Na + H_2O \rightarrow NaOH + H_2$

19 A soft metal reacts vigorously with cold water.

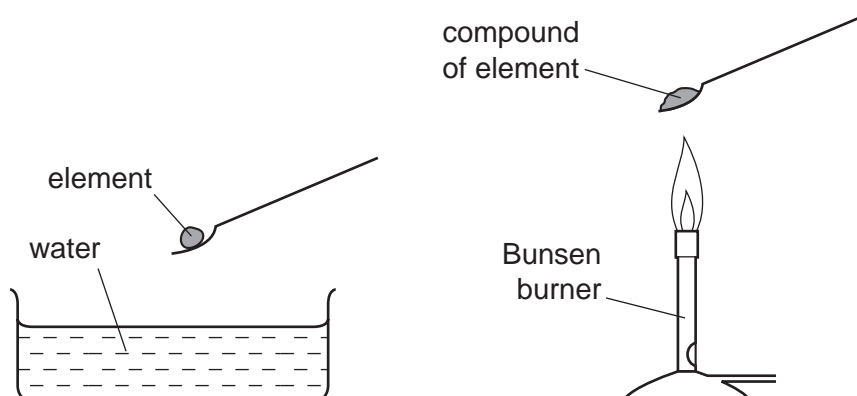
Which letter shows the position of this metal in the Periodic Table?


20 Which two elements do **not** form an alloy?

- A carbon and sulfur
- B carbon and iron
- C copper and zinc
- D silver and gold

- 21 In an experiment the elements calcium, copper, potassium and sodium were separately reacted with water.

In a second experiment a flame test was carried out on compounds of each of the elements.

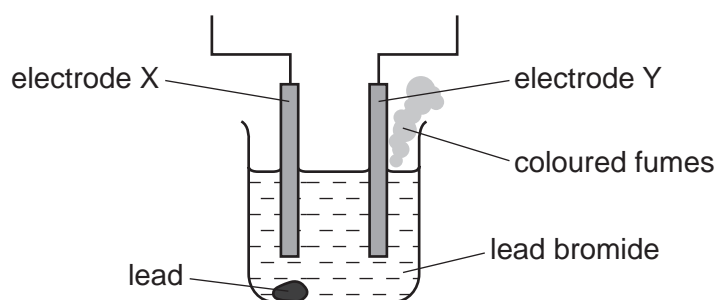


Which row correctly shows the reaction of the elements with water and the colour of the flame?

	element	reaction with water	colour of the flame
<b>A</b>	calcium	vigorous	green
<b>B</b>	copper	no reaction	red
<b>C</b>	potassium	vigorous	lilac
<b>D</b>	sodium	no reaction	yellow

- 22 The diagram shows the electrolysis of lead(II) bromide using inert electrodes.

Lead is formed at electrode X and coloured fumes at electrode Y.



Which statement about the electrolysis of lead(II) bromide is correct?

- A** Electrode X is the anode.
- B** The colour of the fumes is brown.
- C** The lead(II) bromide is in aqueous solution.
- D** The mass of the lead(II) bromide does not change during the reaction.

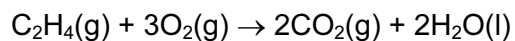


23 When compound X is added to pure water, the pH increases.

Which formula could **not** be a correct formula for X?

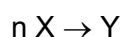
- A  $\text{HNO}_3$       B  $\text{KOH}$       C  $\text{NaOH}$       D  $\text{NH}_3$

24 Ethene burns as shown.



What happens to ethene in this reaction?

- A decomposition  
B neutralisation  
C oxidation  
D reduction
- 25 Many molecules of X combine to form a single molecule Y as shown in the equation.



(n is a very large number)

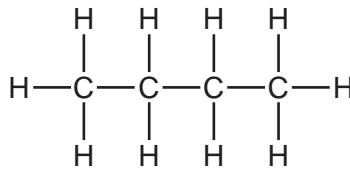
Which terms best describe X and Y in this reaction?

	X	Y
A	fraction	monomer
B	monomer	fraction
C	monomer	polymer
D	polymer	fraction

26 Which change does **not** alter the rate of reaction between zinc and dilute sulfuric acid?

- A addition of a catalyst  
B change in concentration of the acid  
C change in atmospheric pressure  
D change in temperature

27 The structure of a molecule is shown.



Which term correctly describes this molecule?

- A hydrocarbon
- B monomer
- C petroleum
- D polymer

28 The table gives information about a liquid in a container.

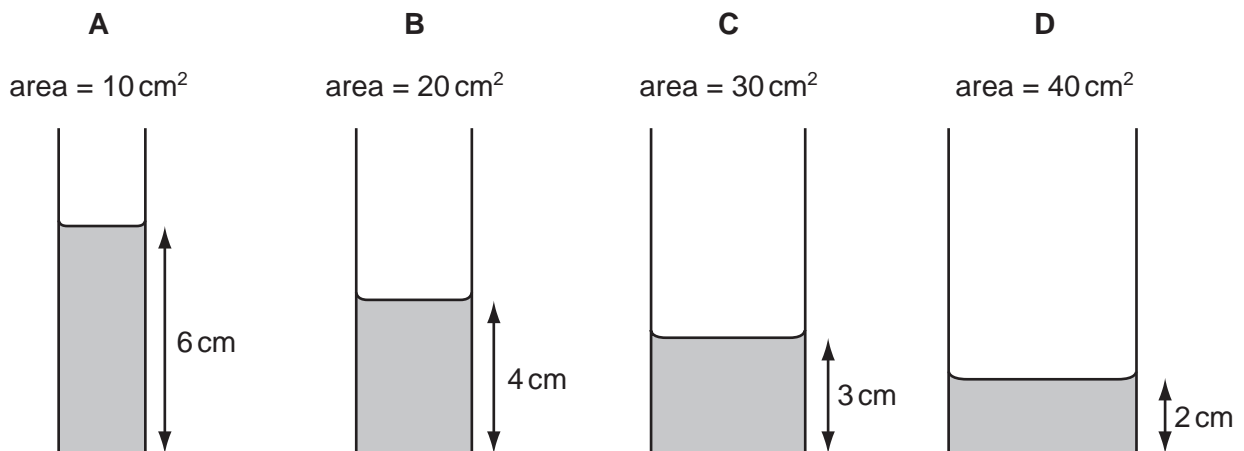
depth of liquid	10 cm
mass of liquid	30 g
temperature of liquid	25 °C
volume of liquid	20 cm <sup>3</sup>

What is the density of the liquid?

- A 0.33 cm/g
- B 1.2 g/°C
- C 1.5 g/cm<sup>3</sup>
- D 3.0 g/cm

29 Some water is poured into four tubes of different cross-sectional areas.

Which tube holds the largest volume of water?



- 30 What is the meaning of the *weight* of an object?
- A the density of the material from which it is made
  - B the force exerted on it by gravity
  - C the mass of the matter it contains
  - D the pressure it exerts on the ground
- 31 Which source releases energy by burning when it is used in the process of generating electricity?
- A a fossil fuel
  - B hydroelectric
  - C nuclear
  - D solar
- 32 An object travels 6.0 km in 2 minutes.  
What is its speed?
- A 0.050 m/s      B 3.0 m/s      C 50 m/s      D 3000 m/s
- 33 When flying, some birds use warm air currents to gain height.  
What is the cause of these currents?
- A conduction
  - B convection
  - C evaporation
  - D radiation

34 Diagram 1 shows two identical resistors  $R_1$  and  $R_2$  connected in series in a circuit.

$R_2$  is then removed, as shown in diagram 2.

diagram 1

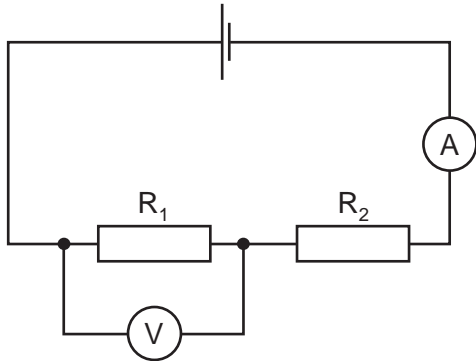
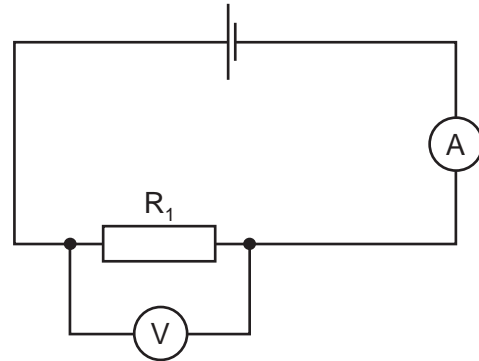


diagram 2



How do the readings on the ammeter and the voltmeter change when  $R_2$  is removed?

	ammeter	voltmeter
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

35 Why is a fuse used in an electric circuit in a house?

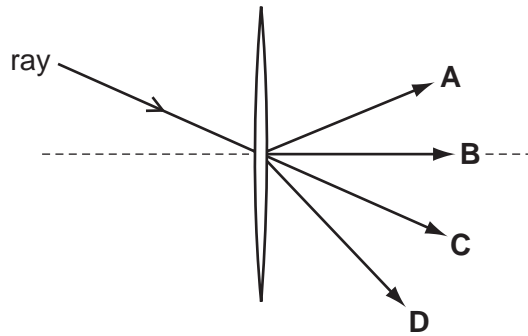
- A** to increase the resistance of the circuit
- B** to keep the power used to a minimum value
- C** to prevent a short circuit from occurring
- D** to stop the cables overheating

36 Which row shows two of the essential items used in the construction of a transformer?

	iron core	permanent magnet	primary coil	slip rings
<b>A</b>	✓	✓		
<b>B</b>	✓		✓	
<b>C</b>		✓		✓
<b>D</b>			✓	✓

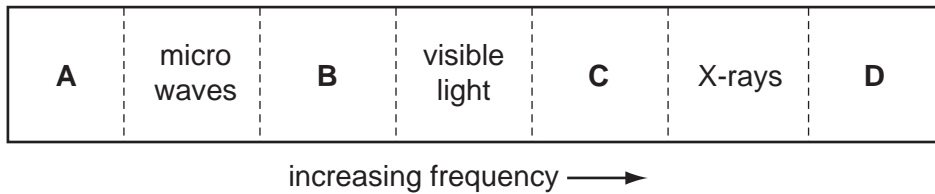
37 A ray of light passes through the centre of a thin converging lens.

In which direction does the ray leave the lens?



38 The diagram shows the spectrum of electromagnetic waves.

Which labelled region represents gamma rays?



39 Which is the best description of a wave that is a quiet, high-pitched sound?

- A large amplitude and high frequency.
- B large amplitude and low frequency.
- C small amplitude and high frequency.
- D small amplitude and low frequency.

40 Which nuclear process occurs in the Sun, and which process is used in a nuclear power station?

	in the Sun	in a nuclear power station
A	fission	fission
B	fission	fusion
C	fusion	fission
D	fusion	fusion





**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																											
		I	II	III	IV	V	VI	VII	VIII	IX	X																		
		1 <b>H</b> Hydrogen 1																											
7	9	<b>Li</b> Lithium 3	<b>Be</b> Beryllium 4									<b>He</b> Helium 2																	
23	24	<b>Na</b> Sodium 11	<b>Mg</b> Magnesium 12									<b>Ne</b> Neon 10																	
39	40	<b>K</b> Potassium 19	<b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36													
85	88	<b>Rb</b> Rubidium 37	<b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	101 <b>Ru</b> Ruthenium 44	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54													
133	137	<b>Cs</b> Caesium 55	<b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	209 <b>Pb</b> Lead 82	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	209 <b>Po</b> Polonium 84	209 <b>At</b> Astatine 85	209 <b>Rn</b> Radon 86											
87	226	<b>Fr</b> Francium 87	<b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																									
												*58-71 Lanthanoid series		†90-103 Actinoid series															
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">a</td> <td style="padding: 2px;"><b>X</b></td> </tr> <tr> <td style="padding: 2px;">b</td> <td style="padding: 2px;"></td> </tr> </table>		a	<b>X</b>	b		a = relative atomic mass		X = atomic symbol		b = proton (atomic) number																	
a	<b>X</b>																												
b																													
		<table border="1" style="display: inline-table; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Key</td> <td style="padding: 2px;"><b>X</b></td> </tr> <tr> <td style="padding: 2px;"></td> <td style="padding: 2px;"></td> </tr> </table>		Key	<b>X</b>			140 <b>Ce</b> Cerium 58		141 <b>Pr</b> Praseodymium 59		144 <b>Nd</b> Neodymium 60		150 <b>Sm</b> Samarium 62		152 <b>Eu</b> Europium 63		157 <b>Gd</b> Gadolinium 64		162 <b>Dy</b> Dysprosium 66		165 <b>Ho</b> Holmium 67		169 <b>Tm</b> Thulium 69		173 <b>Yb</b> Ytterbium 70		175 <b>Lu</b> Lutetium 71	
Key	<b>X</b>																												
		232 <b>Th</b> Thorium 90		238 <b>U</b> Uranium 92		238 <b>U</b> Uranium 92		93 <b>Np</b> Neptunium 93		94 <b>Pu</b> Plutonium 94		95 <b>Am</b> Americium 95		96 <b>Cm</b> Curium 96		97 <b>Bk</b> Berkelium 97		98 <b>Cf</b> Californium 98		99 <b>Es</b> Einsteinium 99		100 <b>Fm</b> Fermium 100		101 <b>Md</b> Mendelevium 101		102 <b>No</b> Nobelium 102		103 <b>Lr</b> Lawrencium 103	

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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