



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

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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

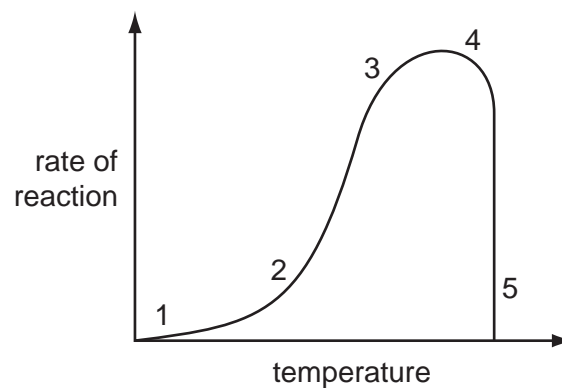
2 Which parts of a cell control its activities and control what enters and leaves it?

	controls cell's activities	controls what enters and leaves the cell
A	chloroplast	cell surface membrane
B	chloroplast	cell wall
C	nucleus	cell surface membrane
D	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
A	in	in
B	in	out
C	out	in
D	out	out

- 6 What happens during digestion?

	large pieces of food are broken into small pieces	large molecules are broken into small molecules
A	✓	✓
B	✓	x
C	x	✓
D	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
A	aorta	pulmonary vein
B	pulmonary artery	vena cava
C	pulmonary vein	aorta
D	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

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

Which offspring will be clones?

	offspring from sexual reproduction	offspring from asexual reproduction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

- 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 ³)
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
A	chemical	heat
B	chemical	light
C	heat	chemical
D	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

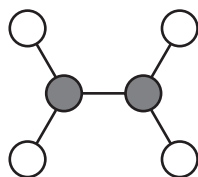
13 Albino humans cannot make any pigment in their skin.

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
A	compound	NH ₂
B	compound	N ₂ H ₄
C	mixture	NH ₂
D	mixture	N ₂ H ₄

15 Element X has a nucleon number of 40.

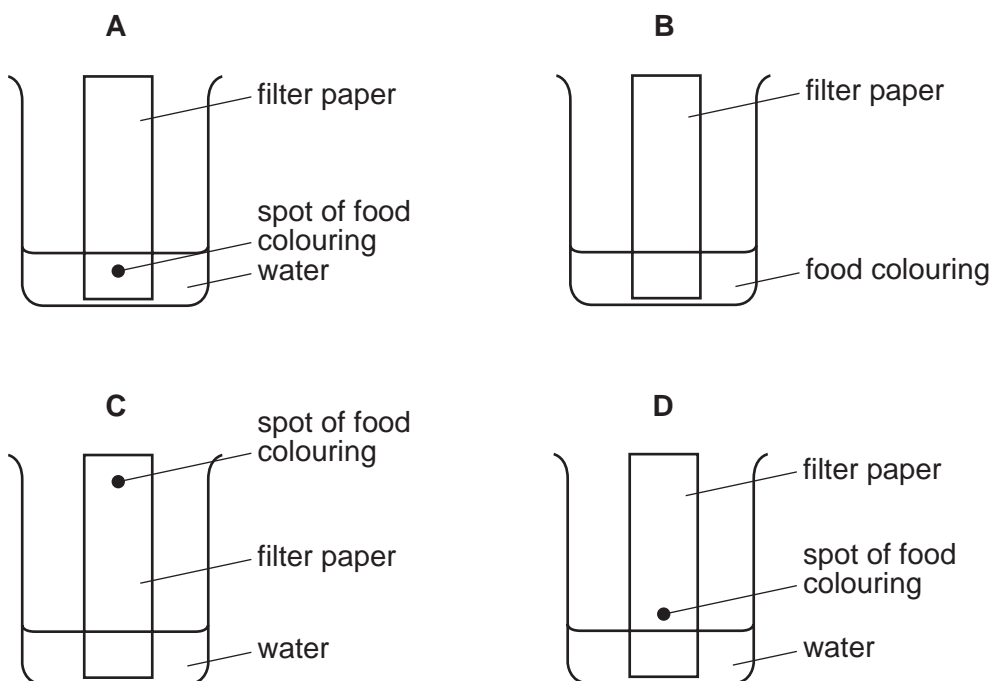
The electron arrangement of element X is 2,8,8.

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
A	✓	✓	✓
B	✓	✓	x
C	✓	x	x
D	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?

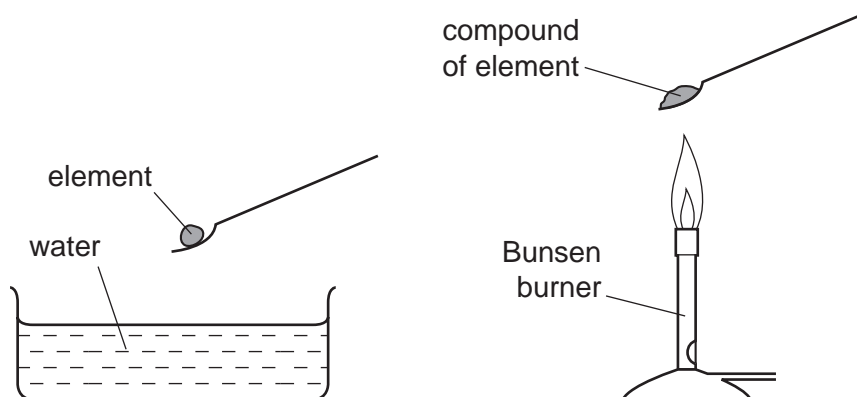
	D																			
			C																	
																			B	
																				A

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.

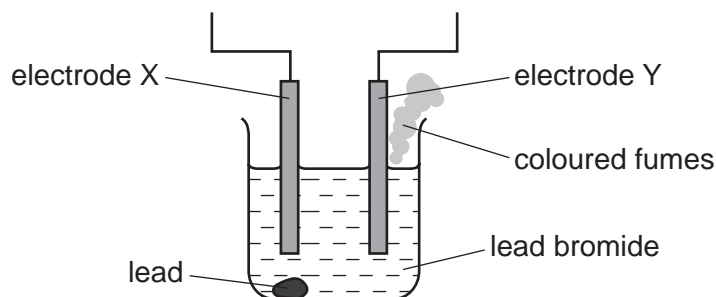


Which row correctly shows the reaction of the elements with water and the colour of the flame?

	element	reaction with water	colour of the flame
A	calcium	vigorous	green
B	copper	no reaction	red
C	potassium	vigorous	lilac
D	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?

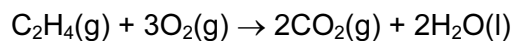
- A** Electrode X is the anode.
- B** The colour of the fumes is brown.
- C** The lead(II) bromide is in aqueous solution.
- D** The mass of the lead(II) bromide does not change during the reaction.

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

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

- A HNO_3 B KOH C NaOH D NH_3

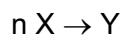
24 Ethene burns as shown.



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)

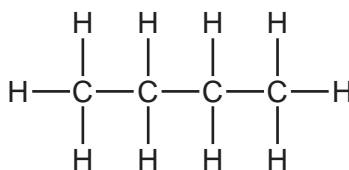
Which terms best describe X and Y in this reaction?

	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.

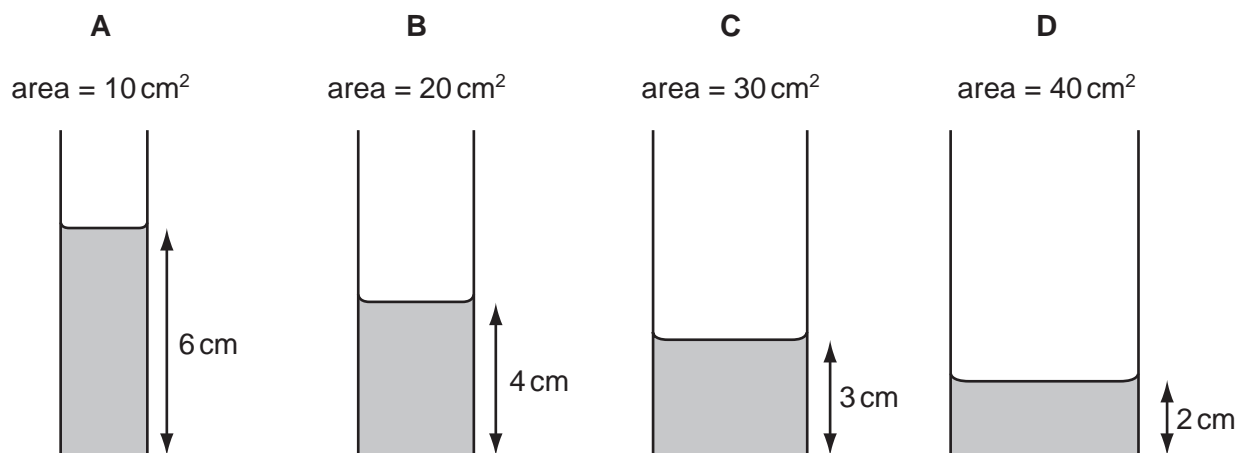
depth of liquid	10 cm
mass of liquid	30 g
temperature of liquid	25 °C
volume of liquid	20 cm ³

What is the density of the liquid?

- A 0.33 cm/g
- B 1.2 g/°C
- C 1.5 g/cm³
- 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

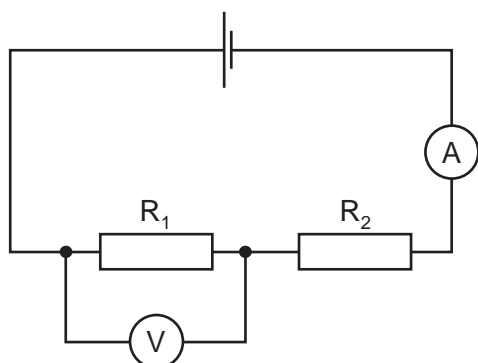
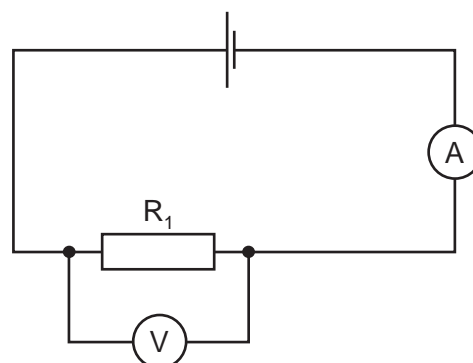


diagram 2



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

	ammeter	voltmeter
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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

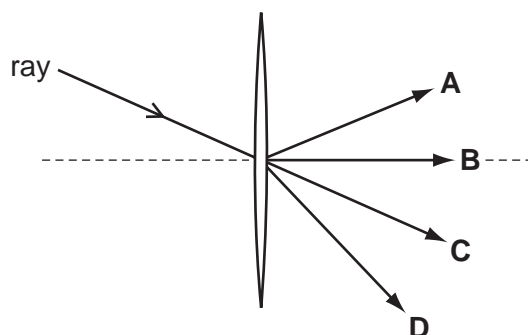
- A** to increase the resistance of the circuit
- B** to keep the power used to a minimum value
- C** to prevent a short circuit from occurring
- D** to stop the cables overheating

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

	iron core	permanent magnet	primary coil	slip rings
A	✓	✓		
B	✓		✓	
C		✓		✓
D			✓	✓

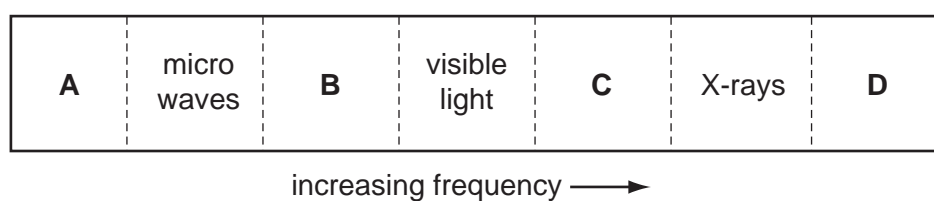
37 A ray of light passes through the centre of a thin converging lens.

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	0					0											
		1 H Hydrogen 1										4 He Helium 2											
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10						
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18						
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36								
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54								
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86								
226 Ra Radium 88	227 Ac Actinium 89											140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
		232 Th Thorium 90	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103									

*58-71 Lanthanoid series
†90-103 Actinoid series

Key
 a = relative atomic mass
 X = atomic symbol
 b = proton (atomic) number

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