

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

### **CO-ORDINATED SCIENCES**

0654/13

Paper 1 Multiple Choice October/November 2013

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.

DO NOT WRITE IN ANY BARCODES.

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.

Electronic calculators may be used.

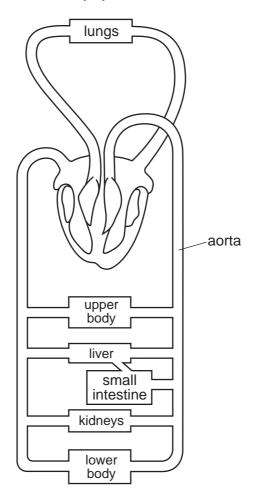




1 A student was walking through some grass when he saw an object with a hole in its outer covering. When touched, a jet of fluid came out of the hole and the object moved away.

Which characteristics of living organisms has the object shown?

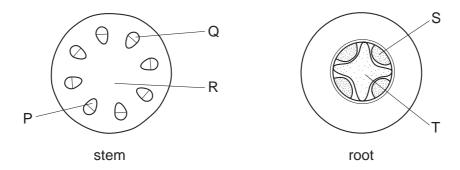
- A excretion, nutrition
- B movement, respiration
- C movement, sensitivity
- **D** nutrition, sensitivity
- **2** The diagram shows the blood circulatory system of a human.



How many times must a blood cell pass through the heart on its way from the kidneys to the aorta?

- A once only
- **B** twice only
- C four times
- **D** more than four times

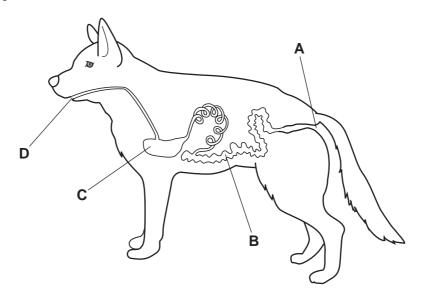
3 The diagrams show sections through a stem and a root.



Which indicate the positions of the phloem?

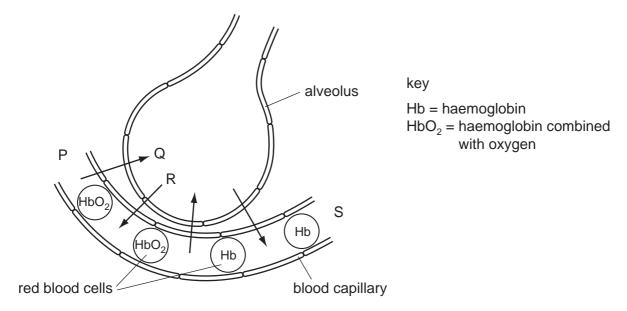
- A Pand S
- **B** P and T
- **C** Q and S
- **D** R and T
- 4 The diagram shows the alimentary canal of a dog.

Where does egestion occur?



- 5 Which statement about asexual reproduction is correct?
  - **A** It involves the formation of a haploid zygote.
  - **B** It involves the fusion of haploid nuclei.
  - **C** It produces offspring that are genetically dissimilar to their parents.
  - **D** It produces offspring that are genetically identical to one another.

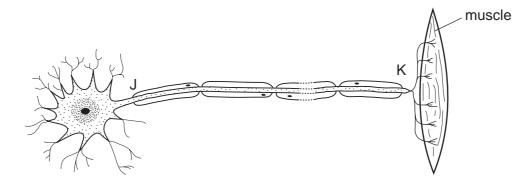
- **6** Which structures make up the nervous system?
  - A brain, nerves, spinal cord
  - B effectors, impulses, spinal cord
  - C impulses, muscles, nerves
  - **D** effectors, receptors, stimuli
- 7 The diagram shows an alveolus, a blood capillary and some red blood cells.



What is the direction of blood flow in the capillary and the direction of diffusion of oxygen?

	blood flow	oxygen diffusion
Α	P to S	Q
В	P to S	R
С	S to P	Q
D	S to P	R

8 The diagram shows a nerve cell and associated structures.

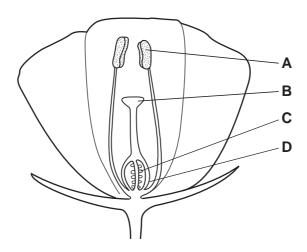


What type of nerve cell is it and in which direction do impulses travel?

	type of nerve cell	direction of impulse
Α	motor	J to K
В	motor	K to J
С	sensory	J to K
D	sensory	K to J

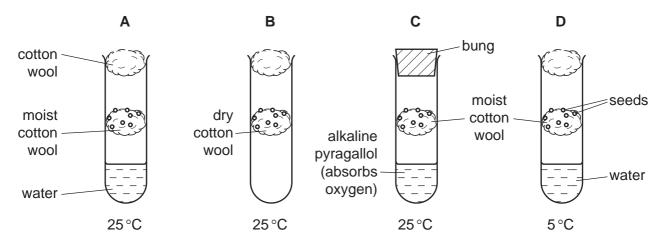
**9** The diagram shows a section through an insect-pollinated flower.

When pollination occurs where must the pollen grains reach?



10 Seeds were placed on cotton wool in each of the tubes shown in the diagrams.

In which tube would germination start first?

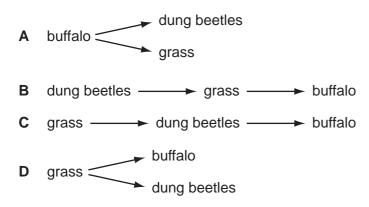


**11** The alleles for a particular character are H and h.

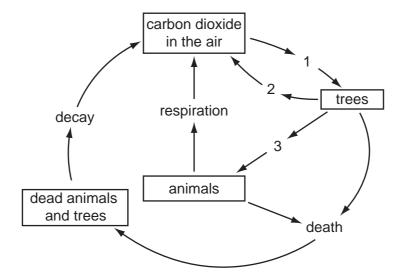
Which term describes an organism whose genotype is HH?

- A heterozygous
- **B** homozygous
- C phenotype
- **D** recessive
- 12 Dung beetles lay their eggs in the faeces of plant-eating mammals like buffalo. Both the adult beetles and their young stages eat the **undigested** food in the faeces.

Which shows this food relationship?



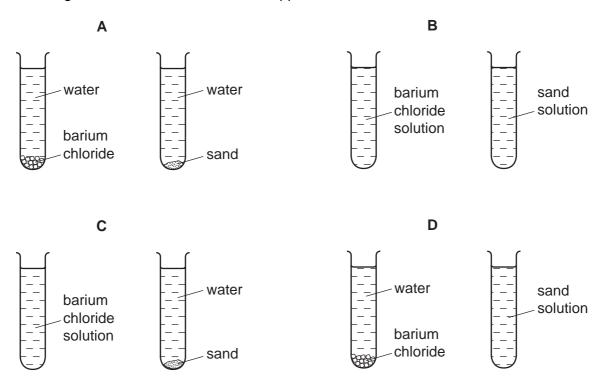
13 The diagram shows part of the carbon cycle in a forest. The numbers represent different processes.



Which of these processes is reduced as a result of deforestation?

- A 1 only
- B 1 and 2 only
- C 2 and 3 only
- **D** 1, 2 and 3
- **14** Small amounts of barium chloride and sand are shaken with separate samples of water in two test-tubes. The test-tubes are left to stand for 24 hours.

Which diagram shows how the test-tubes appear at the end?

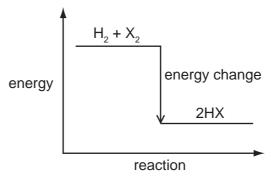


15 Which of the substances can conduct electricity?

	solid copper	molten copper	solid sodium chloride	molten sodium chloride	
Α	✓	✓	✓	✓	key
В	✓	✓	×	✓	✓ = conduct
С	X	✓	✓	✓	x = does not conduct
D	X	✓	X	✓	

16 The diagram shows the energy change for the reactions between hydrogen and the halogens.

The size of the energy change is different for each halogen.



The reaction is  $H_2$  +  $X_2 \rightarrow 2HX$ 

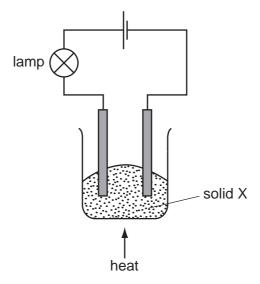
The diagram shows that the reactions are .....1.....

The most reactive halogen is  $\dots$  and therefore the energy change for this element is  $\dots$ 3......

Which words complete gaps 1, 2 and 3?

	1	2	3
Α	endothermic	fluorine	least
В	endothermic	iodine	least
С	exothermic	fluorine	greatest
D	exothermic	iodine	greatest

17 The experiment shown is used to investigate the properties of solid X.

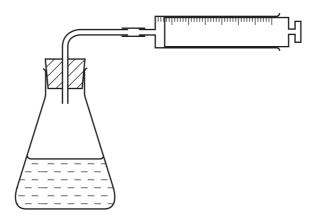


At first, the lamp does not light.

On heating, solid X melts and the lamp lights.

What type of substance is X?

- A a compound of a metal and a non-metal
- **B** a compound of two non-metals
- **C** a metallic element
- **D** a non-metallic element
- **18** The diagram shows apparatus used to investigate the speed of a reaction.



Which other item is essential for this investigation?

- A a Bunsen burner
- **B** a measuring cylinder
- **C** a stopclock
- **D** a thermometer

**19** Brine is a mixture of salt (sodium chloride) and water.

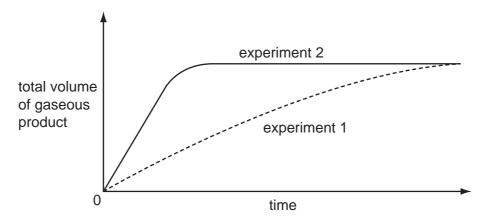
Which row describes these substances?

	solute	solvent	solution
Α	brine	salt	water
В	brine	water	salt
С	salt	brine	water
D	salt	water	brine

20 Substance X does not react with dilute acid. Substance Y reacts with dilute acid, forming a gas.

The graph shows the results of two experiments.

experiment 1 
$$Y + \text{dilute acid}$$
  
experiment 2  $X + Y + \text{dilute acid}$ 



What do these results show?

	X is a catalyst	X is quickly used up	
Α	✓	✓	key
В	✓	X	✓= true
С	×	✓	x = false
D	x	x	

21 The box shows four substances.



Which substance is an element that forms a basic oxide and coloured compounds?

 $\mathbf{A}$  Br<sub>2</sub>

**B** CO

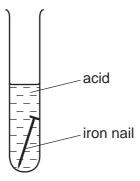
**C** Cu

**D** Na

22 A cup is made of copper.

Why is the cup **not** used for hot drinks?

- A Copper is a good conductor of heat.
- **B** Copper is a good electrical conductor.
- **C** Copper is brightly coloured.
- **D** Copper reacts with saliva.
- 23 An iron nail dissolves in an acid to form a salt solution.



The salt solution forms a green precipitate with sodium hydroxide solution.

The salt solution also forms a white precipitate with barium chloride solution.

What is the salt solution?

- A iron(II) chloride
- B iron(III) chloride
- C iron(II) sulfate
- **D** iron(III) sulfate
- 24 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

	type of reaction	temperature change
Α	endothermic	decrease
В	endothermic	increase
С	exothermic	decrease
D	exothermic	increase

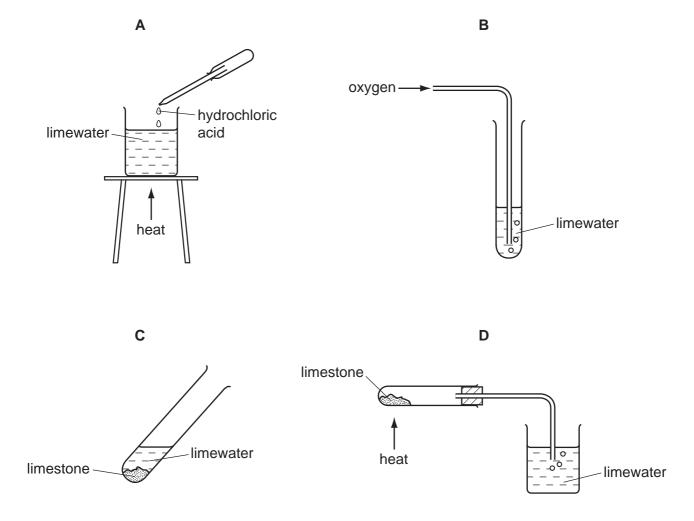
25 The elements in a Group of the Periodic Table are solid at 20 °C.

The reactivity of the elements increases down the group.

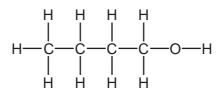
Which statements about this group of elements and their oxides are correct?

	the elements are in	their oxides are
Α	Group I	acidic
В	Group I	basic
С	Group VII	acidic
D	Group VII	basic

26 In which experiment does limewater become milky?

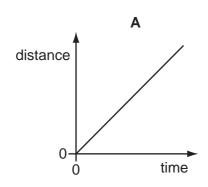


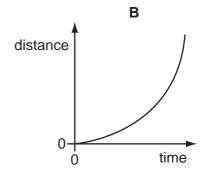
**27** The structure of compound P is shown.

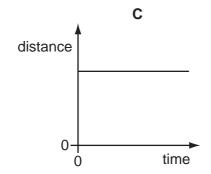


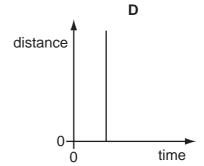
Which type of compound is P?

- A acid
- **B** alcohol
- C alkane
- **D** alkene
- 28 Which is the distance/time graph for an object moving with constant speed?

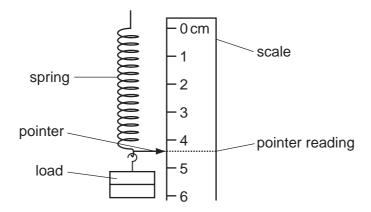








29 The diagram shows the arrangement a student uses in an experiment.



She writes down the steps in the order that she follows them, so that she can plot an extension/load graph for the spring.

Which step is **not** correct?

- A Each pointer reading is plotted against the corresponding load.
- **B** She subtracts the original length of the spring from each pointer reading.
- **C** The load is added in stages to the lower end of the spring.
- **D** The reading of the pointer against the scale is recorded for each different load.
- 30 A student writes an answer.

Energy is measured in joules.
Power and work are both
measured in watts.

Why is this incorrect?

- A Energy is measured in watts.
- **B** Power is measured in joules.
- **C** Power is measured in newtons.
- **D** Work is measured in joules.

31 Liquid in a beaker evaporates quickly.

Which row shows what happens to the mass and to the temperature of the liquid in the beaker?

	mass	temperature
Α	decreases	decreases
В	decreases	increases
С	increases	decreases
D	increases	increases

32 Two identical metal rods are 25 cm long at room temperature (20 °C).

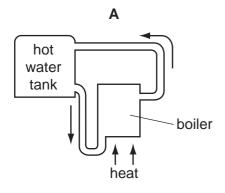
One rod is put into a freezer at a temperature of  $-18\,^{\circ}$ C. The other rod is put into an oven at a temperature of 200  $^{\circ}$ C. The rods are left for several hours.

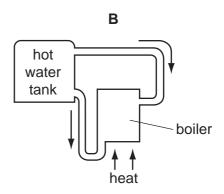
Which row shows the new length of each rod?

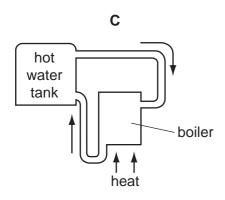
	length of rod at –18°C	length of rod at 200°C
Α	25 cm	25 cm
В	25 cm	more than 25 cm
С	less than 25 cm	25 cm
D	less than 25 cm	more than 25 cm

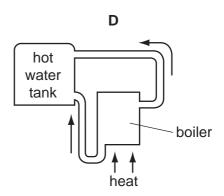
**33** The diagrams show part of a water-heating system which is working by convection.

Which diagram shows the flow of water in the system?









- **34** Which type of wave is longitudinal?
  - A light wave
  - B radio wave
  - C sound wave
  - **D** water wave
- 35 A plane mirror forms an image of an object placed in front of it.

Which row describes the image?

	image type	image size
Α	real	same size as object
В	real	smaller than object
С	virtual	same size as object
D	virtual	smaller than object

**36** Red light and violet light have different frequencies and different wavelengths.

Which colour light has the higher frequency and which has the larger wavelength?

	higher frequency	larger wavelength
Α	red	red
В	red	violet
С	violet	red
D	violet	violet

**37** What is the approximate value of the frequency of the highest-pitched sound that can be heard by a young person?

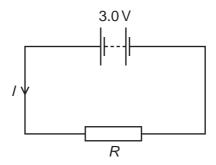
**A** 20 Hz

**B** 200 Hz

**C** 2000 Hz

**D** 20 000 Hz

**38** The circuit shows a current I in a resistor of resistance R.



Which row gives possible values of *I* and of *R*?

	I/A	$R/\Omega$
Α	1.5	1.5
В	1.5	2.0
С	6.0	2.0
D	4.0	12.0

**39** Which row shows how lamps are connected in a domestic lighting circuit, and gives an advantage of connecting them in this way?

	how lamps are connected	advantage of connecting them in this way						
Α	in parallel	they can be switched separately						
В	in parallel	they share the voltage						
С	in series	they can be switched separately						
D	in series	they share the voltage						

**40** An atom of beryllium is represented by  ${}^9_4$ Be.

How many neutrons are in the nucleus of this type of beryllium atom?

- **A** 4
- **B** 5
- **C** 9
- **D** 13

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DATA SHEET
The Periodic Table of the Elements

	0	4 <b>He</b> Helium	Neon Neon 40	Argon	8 7	Krypton 36	131	Xe	Xenon 54		Ru	Radon 86		172	Lu Lutetium		בֿ	Lawrencium 103
	IIΛ		19 Fluorine 9 35.5 <b>C2</b>		® <b>&amp;</b>	Bromine 35	127	_	lodine 53		¥	Astatine 85		170	Yb Ytterbium 70			Nobelium 102
	5		Oxygen 8		Se 3	Selenium 34	128	<u>e</u>	Tellurium 52			Polonium 84		09	<b>Tm</b> Thulium			Mendelevium 101
	>		7 Nitrogen 7	Phosphorus 15	75 <b>As</b>	Arsenic 33	122	Sp	Antimony 51	209	<u>.</u>	Bismuth 83		797	Frbium 68			Fermium 100
	2		Carbon 6	_	۶ G	Germanium 32		Sn		207	Вр	Lead 82		0.0	Holmium 67			Einsteinium 99
	≡		11 Boron 5 27 <b>A1</b>	Aluminium 13	e B	Gallium 31	115	_	Indium 49	204	11	Thallium 81		6	Dy Dysprosium 66			Californium 98
					es Zn	Zinc 30	112	ဦ	Cadmium 48	201	Нg	Mercury 80		200	<b>Tb</b> Terbium 65		쓢	Berkelium 97
					<sup>62</sup>	Copper 29	108	Ag		197	Αn	Gold 79		157	Gadolinium 64			Curium 96
Group					6 <b>\( \bar{\bar{\bar{\bar{\bar{\bar{\bar{</b>	Nickel 28	106	Pd	Palladium 46	195	Ŧ	Platinum 78		750	Europium 63		Am	Americium 95
ອັ					<sub>0</sub> 0	Cobalt 27	103	R	Rhodium 45	192	_	Iridium 77		200	Samarium 62		Pu	Plutonium 94
		T Hydrogen			56 <b>Fe</b>	Iron 26	101	Ru	Ruthenium 44	190	Os	Osmium 76			Pm Promethium 61		ď	Neptunium 93
					SS Mn	Manganese 25		ဥ	Technetium 43	186	Re	Rhenium 75		7	Neodymium 60	238	>	Uranium 92
					ದ ಜ	Chromium 24	96	W	Molybdenum 42	184	>	Tungsten 74			Pr Praseodymium 59		Ра	Protactinium 91
					5 >	Vanadium 23	93	9 N	Niobium 41	181	Та	Tantalum 73		4	Cerium	232	두	Thorium 90
					84 <b>F</b>	Titanium 22	91	Zr	Ziroonium 40	178	Ξ	Hafnium 72				nic mass	loqu	nic) number
					Sc 45	Scandium 21	88	<b>&gt;</b>	Yttrium 39	139	La	Lanthanum 57 *	AC Actinium	8	d series series	a = relative atomic mass	X = atomic symbol	b = proton (atomic) number
	=		Be Beryllium 4 24 NG	Magnesium 12	9 <b>%</b>	Calcium 20	88	S	Strontium 38	137	Ba	Barium 56	226 <b>Ra</b>	8	*58-71 Lanthanoid series 190-103 Actinoid series	а	× ×	
	_		Lithium  Lithium  23	Sodium 11	® <b>×</b>	Potassium 19	85	Rb	Rubidium 37	133	Cs	Caesium 55	Francium	ò .	*58-711 190-103		Key	q

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