



Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice October/November 2014

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, 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.

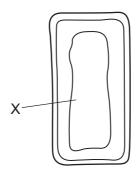
Any rough working should be done in this booklet.

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

Electronic calculators may be used.



1 The diagram shows parts of a mesophyll cell.



What will be found in the part labelled X?

- A chloroplasts and nucleus
- **B** chloroplasts only
- C nucleus only
- D watery solution
- 2 A carbon dioxide molecule diffuses into a plant cell.

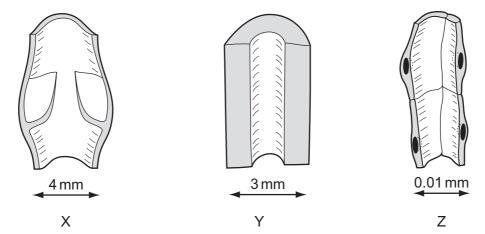
In which order does it pass through these structures?

- **A** cell membrane \rightarrow cell wall \rightarrow cytoplasm
- **B** cell wall \rightarrow cell membrane \rightarrow cytoplasm
- **C** cytoplasm \rightarrow cell membrane \rightarrow cell wall
- $\textbf{D} \quad \text{cytoplasm} \rightarrow \text{cell wall} \rightarrow \text{cell membrane}$
- **3** Four statements about enzymes in the human body are listed.
 - 1 They are all proteins.
 - 2 They catalyse reactions in the body.
 - 3 They stop working at temperatures over 75 °C.
 - 4 They work faster at 30 °C than at 10 °C.

Which statements are correct?

A 1, 2, 3 and 4 **B** 1 and 3 only **C** 2 and 3 only **D** 2 and 4 only

4 The diagram shows three blood vessels in longitudinal section.

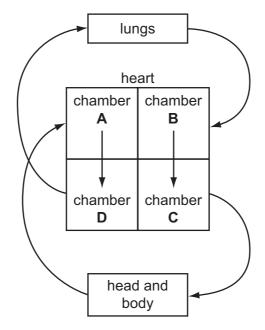


What are X, Y and Z?

	Х	Y	Z
Α	artery	capillary	vein
В	artery	vein	capillary
С	vein	artery	capillary
D	vein	capillary	artery

5 The diagram represents the human blood system.

Which chamber of the heart is the left ventricle?



- 6 During expiration, in which order does air pass through these structures?
 - **A** alveoli → bronchi → bronchiole → larynx
 - **B** alveoli → bronchiole → bronchi → larynx
 - **C** $larynx \rightarrow bronchi \rightarrow bronchiole \rightarrow alveoli$
 - **D** $larynx \rightarrow bronchiole \rightarrow bronchi \rightarrow alveoli$
- 7 Which structure carries nerve impulses away from the central nervous system?
 - A motor neurone
 - **B** relay neurone
 - C sensory neurone
 - **D** spinal cord
- **8** A student observes some grass seedlings which have light coming from one side only. He believes that the tips of the seedlings have a receptor for light. He removes the tips of the seedlings and waits for a day.

Which change in the seedlings would show that he is right?

- A They grow away from the light.
- **B** They grow towards the light.
- **C** They stop growing.
- **D** They grow straight up.
- **9** When a woman ovulates, into which structure is the egg first released?
 - A ovary
 - **B** oviduct
 - C uterus
 - D vagina
- 10 In human reproduction, which cells are haploid?

	gametes	zygotes
Α	✓	✓
В	✓	x
С	x	✓
D	x	x

- 11 Which statement about human gametes is correct?
 - **A** 50% of egg cells contain a Y chromosome.
 - **B** 50% of sperm cells contain a Y chromosome.
 - **C** 100% of egg cells contain a Y chromosome.
 - **D** 100% of sperm cells contain a Y chromosome.
- 12 Cystic fibrosis is an inherited disease.

Only people who are homozygous recessive, ff, have this disease.

Which cross could **not** give rise to a child suffering from cystic fibrosis?

- $\mathbf{A} \quad \mathbf{ff} \times \mathbf{ff}$
- **B** $Ff \times ff$
- $\mathbf{C} \quad \mathsf{Ff} \times \mathsf{Ff}$
- **D** $FF \times ff$

13 The diagram shows a food chain.

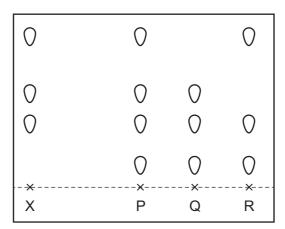
grass
$$\rightarrow$$
 gnu \rightarrow lion \rightarrow flea

Which statement describes a member of this food chain?

- A The flea is a consumer.
- **B** The gnu is a producer.
- **C** The grass is a consumer.
- **D** The lion is a producer.
- **14** Dye X is a mixture of different coloured substances.

Chromatography is used to compare X with three other mixtures, P, Q and R.

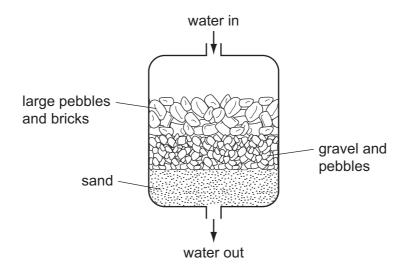
The results are shown in the diagram.



Which other mixtures contain the dye X?

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

- 15 Which process can be used to produce sodium and chlorine from the compound sodium chloride?
 - A cracking
 - **B** distillation
 - C electrolysis
 - **D** filtration
- 16 The diagram shows one of the steps needed to make drinking water.



Which method of separation is being used?

- A chromatography
- **B** crystallisation
- **C** distillation
- **D** filtration
- 17 Diagrams 1, 2, 3 and 4 represent atoms and molecules.

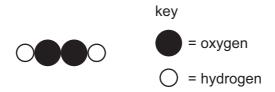


Which statement is correct?

- **A** 1, 2 and 3 are molecules and 4 is an atom.
- **B** 1, 2 and 4 are molecules and 3 is an atom.
- **C** 1, 3 and 4 are molecules and 2 is an atom.
- **D** 2, 3 and 4 are molecules and 1 is an atom.

18 Hydrogen peroxide is a compound.

A molecule of hydrogen peroxide can be represented as shown.



What is the correct formula of hydrogen peroxide?

19 Some properties of three substances are shown.

substance	melting point /°C	boiling point /°C	electrical conductivity when solid
W	801	1413	poor
Х	-111	-78	poor
Υ	1610	2230	good

What are W, X and Y?

	metallic	ionic	covalent
Α	W	Υ	×
В	X	W	Y
С	Y	W	×
D	Υ	X	W

20 When sodium is added to water it reacts violently and melts.

Which row describes the type of reaction and how the temperature of the water changes during the reaction?

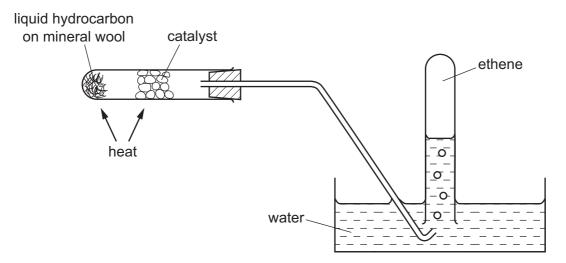
	type of reaction	temperature of the water
Α	endothermic	decreases
В	endothermic	increases
С	exothermic	decreases
D	exothermic	increases

21 Solid copper(II) carbonate reacts with dilute nitric acid producing carbon dioxide.

Which change causes the carbon dioxide to be given off more slowly?

- A Increase the concentration of nitric acid.
- **B** Increase the size of the particles of copper(II) carbonate.
- **C** Increase the temperature of the nitric acid.
- **D** Use a catalyst.
- 22 Which element can be used as a catalyst?
 - **A** palladium (proton number 46)
 - **B** phosphorus (proton number 15)
 - **C** polonium (proton number 84)
 - **D** potassium (proton number 19)
- 23 Why is aluminium used to make food containers?
 - A It has a low melting point.
 - **B** It has a high density.
 - **C** It is strong.
 - **D** It resists corrosion.
- 24 Why is argon used to fill electric lamps?
 - A Argon has a low boiling point.
 - **B** Argon is more dense than air.
 - **C** Argon is only found in a small amount in the atmosphere.
 - **D** Argon is unreactive.

25 The diagram shows an experiment on a liquid hydrocarbon.

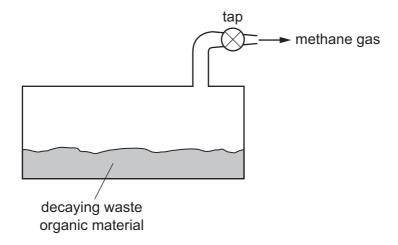


Which change takes place?

- A combustion
- **B** cracking
- C fractional distillation
- **D** polymerisation

26 In which pair are both molecules unsaturated?

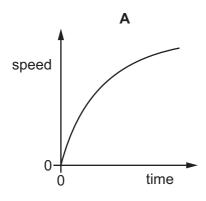
27 The diagram shows waste organic material decaying.

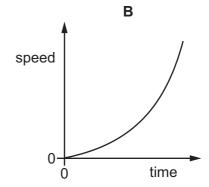


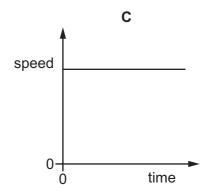
What is formed when the gas, methane, is burned?

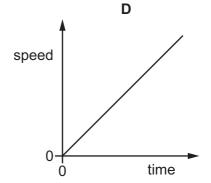
- A carbon dioxide and water
- B carbon dioxide only
- C carbon monoxide
- **D** water only

28 Which speed/time graph represents an object moving with constant positive acceleration?

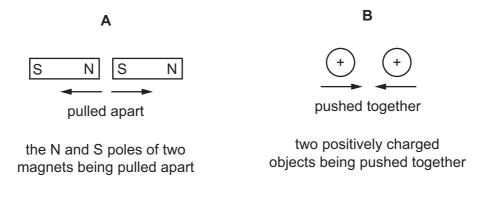


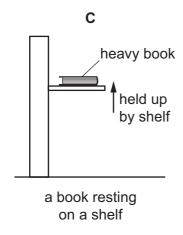


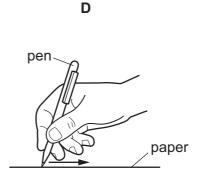




29 Which situation does not involve any work being done?

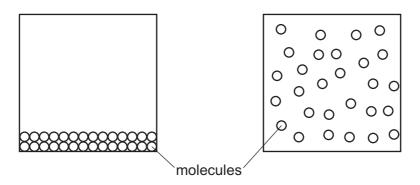






a pen being pulled across a sheet of rough paper

30 The diagram represents two states of a substance.



Which states are represented?

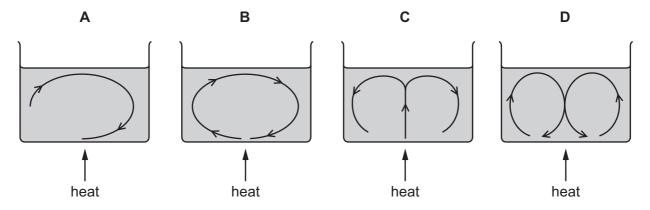
- A liquid and gas
- B liquid and solid
- C solid and gas
- **D** solid and liquid

31 Four students write statements about melting and boiling.

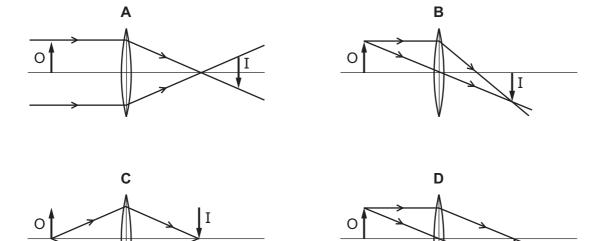
Which statement is **not** correct?

- A A liquid only evaporates when it has reached its boiling point.
- **B** Heat energy is needed to melt a solid.
- **C** When a solid is melting, its temperature does not change.
- **D** When a substance is a liquid, its temperature will not rise above its boiling point.
- **32** A wide container of water is heated from below.

Which diagram shows the convection current(s) in the water?



33 Which diagram shows how a converging lens forms a real image I of an object O?



34 Which row shows electromagnetic waves in order of increasing wavelength?

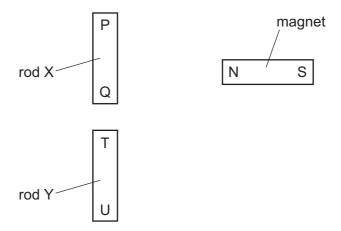
	shortest wavelength		longest wavelength
Α	γ-rays	radio waves	visible light
В	γ-rays	visible light	radio waves
С	visible light	γ-rays	radio waves
D	visible light	radio waves	γ-rays

35 Music is produced by the loudspeaker of a radio.

Which property of the sound waves from the loudspeaker increases when the music is made louder?

- **A** amplitude
- **B** frequency
- C speed
- **D** wavelength

36 Two rods, X and Y, look the same.



The N pole of a magnet is brought close, in turn, to P, Q, T and U. The results of these four actions are shown in the table.

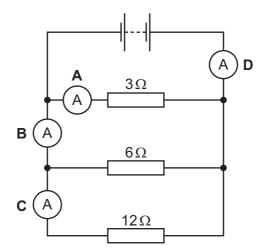
end tested	result
Р	attraction
Q	attraction
Т	attraction
U	repulsion

Which of the rods is a permanent magnet, with a pole at each end?

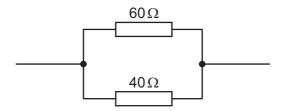
- A both of the rods
- B neither of the rods
- C rod X only
- **D** rod Y only

37 The diagram shows three resistors, a battery and four ammeters connected in a circuit.

Which ammeter shows the highest reading?



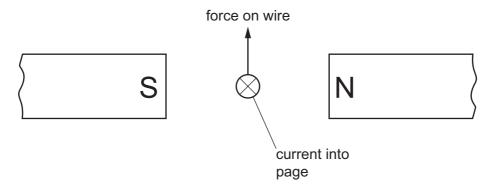
38 A $60\,\Omega$ resistor and a $40\,\Omega$ resistor are connected in parallel.



What is their combined resistance?

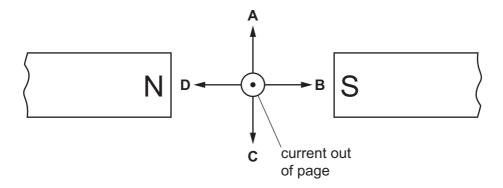
- **A** less than 40Ω
- **B** 50Ω
- **C** between 60Ω and 100Ω
- **D** $100\,\Omega$

39 A wire carries an electric current. The wire is placed between the poles of a magnet. This causes a force that pushes the wire upwards.

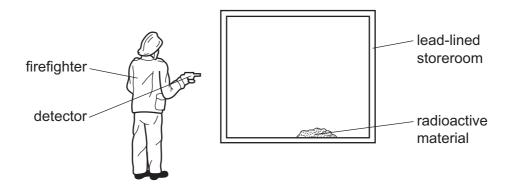


The poles of the magnet and the direction of the current are both reversed.

Which arrow now shows the direction of the force on the wire?



40 During a fire in a laboratory storeroom, some radioactive material is spilt. A firefighter detects radiation through the lead-lined walls of the storeroom. The radiation is emitted by the radioactive material.



Which type of radiation from the radioactive material is detected?

- **A** α -particles
- **B** β-particles
- C γ-rays
- **D** X-rays

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DATA SHEET
The Periodic Table of the Elements

								į	Group								
	=											≡	2	>		NII/	0
							1 Hydrogen										4 He Helium
4	9 Be Beryllium					•		1				11 Boron 5	12 C Carbon	14 X Nitrogen 7	16 Oxygen	19 T Fluorine	20 Neon 10
-	24 Mg Magnesium											27 A1 Auminium 13	28 Si Silicon	31 P Phosphorus 15	32 S ulfur 16	35.5 C1 Chlorine	40 Ar Argon
1 (4	40 Ca Calcium	Scandium Scandium 21	48 T	51 V Vanadium 23	Cr Chromium 24	Manganese	56 Fe Iron	59 Co Cobalt	59 Nickel	64 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
(-)	Sr Strontium	89 ×	2r Zr Zirconium 40	93 Nb Niobium	96 Mo Molybdenum 42		Ru Ruthenium 44	Rhodium 45		108 Ag Silver 47	Cd Cadmium 48	115 In Indium	Sn Tin	Sb Antimony 51	Tellurium 52	127 T lodine	131 Xe Xenon Xenon
4,7	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir	195 Pt Platinum 78	197 Au Gold	201 Hg Mercury 80	204 T 1 Thallium	207 Pb Lead	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Radon 86
ω .	226 Ra Radium 88	227 Ac Actinium †															
	*58-71 Lanthanoid serie 190-103 Actinoid series	*58-71 Lanthanoid series 190-103 Actinoid series		140 Ce Cerium 58	Pr Praseodymium 59	Neodymiur 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	Lu Lutetium
	м Х	 a = relative atomic mass X = atomic symbol b = proton (atomic) number 	ic mass ool ic) number	232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Neptunium	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101		Lr Lawrencium 103

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

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