

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE 0653/12

Paper 1 Multiple Choice October/November 2015

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.

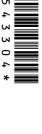
Read the instructions on the Answer Sheet very carefully.

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

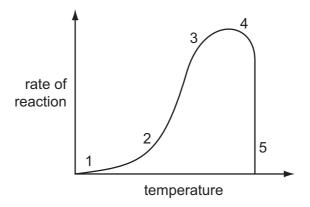
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.



- 1 Which is a characteristic of all living organisms?
 - A breathing
 - **B** eating
 - C egestion
 - **D** movement
- 2 Which process depends on diffusion?
 - A circulation
 - **B** digestion
 - C gaseous exchange
 - **D** phagocytosis
- 3 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?

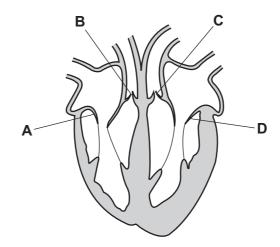
- **A** 1
- **B** 2 and 3
- **C** 3 and 4
- **D** 5
- **4** What is the main use in the human body of carbohydrate?
 - A insulating against cold
 - B making growth possible
 - **C** providing energy
 - **D** rebuilding damaged tissues

5 Which mineral salt and which vitamin does a child need to produce strong bones?

	mineral salt	vitamin		
Α	calcium	С		
В	calcium	D		
С	iron	С		
D	iron	D		

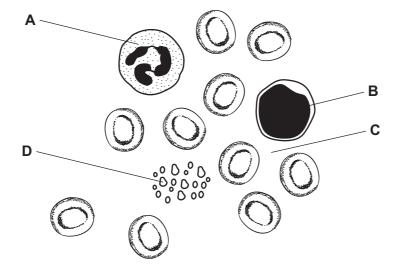
6 The diagram shows a section through the heart.

To ensure that blood will flow to the lungs, which valve must be closed?



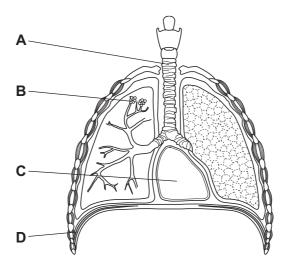
7 The drawing shows some blood, as it appears under the microscope.

Which part carries glucose to muscles?

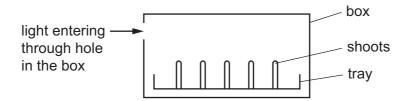


8 The diagram shows some structures in the human thorax (chest).

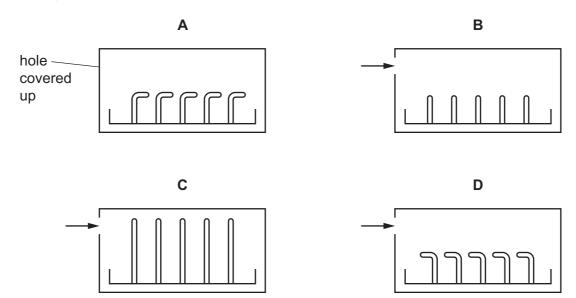
Into which part does carbon dioxide pass immediately after leaving the blood?



9 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?



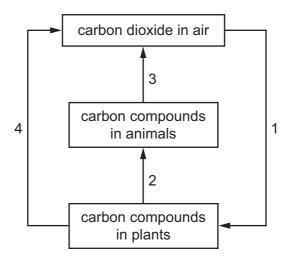
10 When an athlete prepares for the start of a sprint race, excitement causes the concentration of a hormone in the blood to increase.

What effects does the hormone have on the blood glucose concentration and the heart rate of the athlete?

	blood glucose concentration	heart rate
Α	decreases	decreases
В	decreases	increases
С	increases	decreases
D	increases	increases

- **11** Which structure in a flower produces pollen?
 - A sepal
 - **B** stamen
 - C stigma
 - **D** style
- 12 When does the development of a baby begin?
 - A ejaculation of semen
 - B fertilisation of the ovum
 - **C** implantation in the wall of the uterus
 - **D** start of the mother's menstrual cycle

13 The diagram shows part of the carbon cycle.



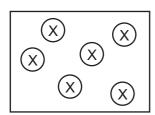
Where does respiration occur?

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

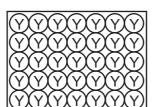
14 (X) and (Y) represent atoms of two different elements.

Which diagram represents molecules?

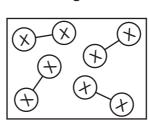
Α



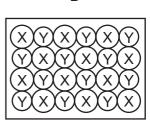
В



C



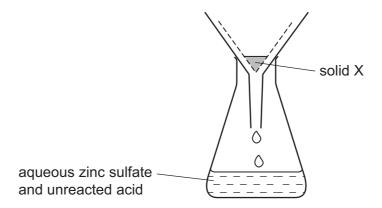
D



15 In an experiment, a mixture of 0.5g of copper and 3g of zinc is added to an excess of dilute sulfuric acid.

The copper acts as a catalyst.

After all the zinc has dissolved, the resulting mixture is filtered.



What is solid X and what is its mass?

	solid X	mass of pure X			
Α	copper	less than 0.5g			
В	copper	0.5 g			
С	copper(II) oxide 0.5 g				
D	copper(II) oxide greater than 0				

16 Element Y has a proton number of 18 and a nucleon number of 40.

Which statements about element Y are correct?

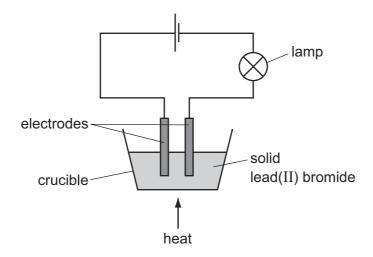
- 1 It has 40 neutrons in its nucleus.
- 2 It has 22 electrons.
- 3 It is unreactive.
- 4 It is in Group 0 of the Periodic Table.
- **A** 1 and 2 **B** 2 and 3 **C** 2 and 4 **D** 3 and 4

17 The structure of a hydrocarbon is shown.

What is the formula of the hydrocarbon?

- **A** C₂H₅
- \mathbf{B} $\mathbf{C}_3\mathbf{H}_8$
- \mathbf{C} C_4H_9
- **D** C_4H_{10}

18 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

Why is heat needed?

- **A** An exothermic reaction takes place in the crucible.
- **B** Electrodes only conduct electricity when hot.
- **C** Heat causes the lead(II) bromide to react with air.
- **D** The lead(II) bromide must be molten.

19 Four different solids are added to water. The initial and final temperatures are recorded.

Which change is the **most** exothermic?

	initial temperature /°C	final temperature /°C		
Α	19	30		
В	20	25		
С	22	18		
D	25	14		

- 20 Which method cannot be used to investigate the rate of a chemical reaction?
 - A Measuring the change in the mass of catalyst.
 - **B** Measuring the change in the mass of the reaction mixture.
 - **C** Measuring the time taken for the reaction to complete.
 - **D** Measuring the volume of gas produced.
- 21 Sulfuric acid reacts with potassium hydroxide.

What are the products of this reaction?

	potassium hydroxide	potassium sulfate	carbon dioxide	water	
Α	✓	X	✓	✓	key
В	X	✓	x	✓	✓= yes
С	x	✓	✓	✓	x = no
D	X	✓	X	X	

22 A substance reacts with dilute acid, producing a gas.

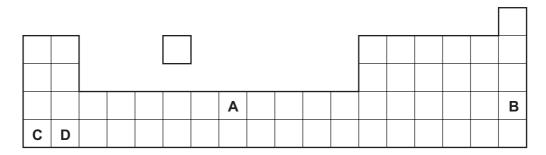
The gas ignites with a pop when tested with a lighted splint.

What is the substance?

- A copper
- B copper(II) oxide
- **C** magnesium
- **D** magnesium carbonate

23 The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?



- **24** Which statement about elements in Period 3 of the Periodic Table is correct?
 - **A** All the elements in Period 3 are metals.
 - **B** All the elements in Period 3 are non-metals.
 - **C** Metals are on the left, non-metals are on the right.
 - **D** Non-metals are on the left, metals are on the right.
- 25 A small piece of a solid element is dropped into a bowl of water.

The element floats on the water, fizzes and burns with a lilac flame.

What is the element?

- A copper
- **B** potassium
- C sodium
- **D** zinc
- **26** When water is purified it is passed through large tanks of sand.

What is the purpose of the sand?

- A to remove all harmful bacteria
- **B** to remove coloured soluble impurities
- **C** to remove small insoluble particles
- **D** to remove tree branches and other large objects

27 Methane, ethane and propane are all alkanes. Their formulae are shown below.

methane, CH_4 ethane, C_2H_6 propane, C_3H_8

Which statement is **not** correct?

- **A** All three of these compounds are hydrocarbons.
- **B** All three of these compounds burn.
- **C** Methane is the main constituent of natural gas.
- **D** Propane burns completely to form carbon dioxide and hydrogen.
- 28 In a race, a car travels 60 times around a 3.6 km track. This takes 2.4 hours.

What is the average speed of the car?

- **A** 1.5 km/h
- **B** 90 km/h
- **C** 144 km/h
- **D** 216 km/h

- 29 Which quantity is measured in newtons?
 - A density
 - **B** energy
 - C potential difference
 - **D** weight
- **30** A student tries to determine the density of a metal block. First he measures the mass of the block and finds its weight. Next he measures the length of the sides of the block and calculates its volume. Finally he divides the weight by the volume.

The student has made a mistake.

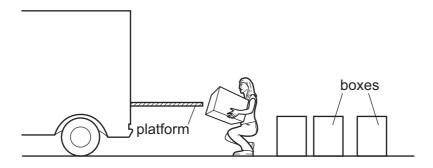
What should he do to determine the density?

- A divide mass by volume
- **B** divide mass by weight
- C divide volume by mass
- **D** divide volume by weight

31 What is the unit for work and what is the unit for power?

	work	power		
Α	J	N		
В	J	W		
С	N	W		
D	W	J		

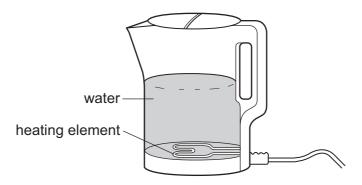
32 A person lifts boxes of equal weight on to a platform.



Which quantity will **not** affect the work done by the person?

- A the height of the platform above the ground
- B the number of boxes lifted
- C the time taken to lift the boxes
- **D** the weight of the boxes
- 33 Which statement about the molecules of a gas at 0 °C is correct?
 - A They do not move.
 - **B** They move about randomly.
 - **C** They move around each other in circular orbits.
 - **D** They vibrate about fixed positions.

34 An electric kettle contains a metal heating element.

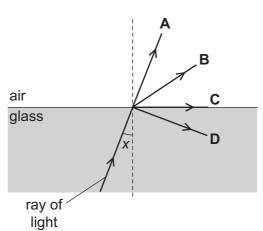


What are the main processes by which heat energy is transferred from the element to the water, and throughout the water?

	heat transf	er process							
	element to water	element to water throughout water							
Α	conduction	convection							
В	conduction radiation								
С	convection radiation								
D	radiation conduction								

35 A ray of light in glass is incident on a boundary with air.

Which path does the light take when the angle of incidence x is significantly less than the critical angle?



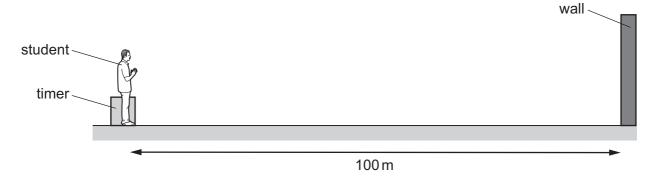
36 The diagram represents the electromagnetic spectrum. Sections P and Q are not named.

gamma rays	ultraviolet waves	visible light	infra-red waves	Q	radio waves	
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Which type of wave does P represent, and which type of wave does Q represent?

	Р	Q		
Α	microwaves	sound waves		
В	microwaves	X-rays		
С	sound waves	microwaves		
D	X-rays	microwaves		

37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall which is 100 m away from him.



An electronic timer detects the echo of the sound 0.60s after it is made.

Which calculation should the student use to determine the speed of sound?

A
$$\frac{100}{0.60}$$
 m/s

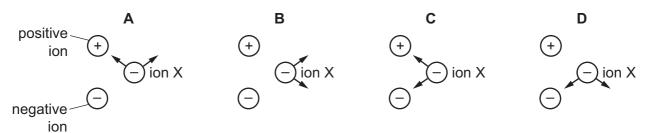
B
$$\frac{100}{1.2}$$
 m/s

$$C = \frac{200}{0.30} \text{ m/s}$$

B
$$\frac{100}{1.2}$$
 m/s **C** $\frac{200}{0.30}$ m/s **D** $\frac{200}{0.60}$ m/s

38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

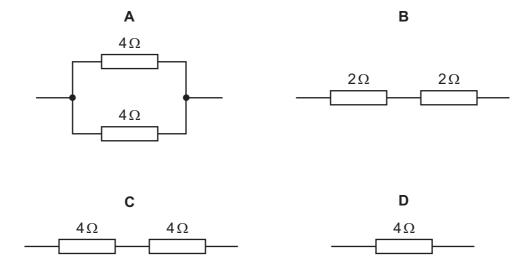
Which diagram shows the directions of the two forces acting on ion X?



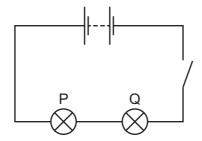
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39 The diagrams show four arrangements of resistors.

Which arrangement has the **smallest** total resistance?



40 Two identical lamps P and Q are connected in a circuit as shown in the diagram.



The circuit is now switched on.

Which statement is correct?

- **A** Each lamp can be switched off independently.
- **B** If lamp Q breaks, lamp P stays alight.
- C Lamp P is brighter than lamp Q.
- **D** The current is the same in both lamps.

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

	0	4 H efium	20 Neon 10 40	Ar Argon	84 Kr Krypton 36	131 Xe Xenon Xenon 554	222 Ra Radon 86		175 Lu Lutetium 71	260 Lr Lawrencium 103
	=	8		C1 Chlorine 17	80 Br Bromine 35	127 H lodine 53	210 At Astatine 85		Y b Ytterbium 70	Nobelium 102
	5		16 Oxygen 32	L	Selenium 34	128 Te Telturium 52	209 Po Polonium 84		169 Tm Thulium	258 Md Mendelevium 101
	>		Nitrogen 8	orus	75 As Arsenic 3	122 Sb Antimony 51	209 Bi Bismuth 83		167 Er Erbium 6	257 Fm Fermium 1100 1
	≥		Carbon 7	_	73 Ge Germanium 32	119 Sn	207 Pb Lead		165 Ho Holmium 6	252 Es Einsteinium 99
	=		111 Boron 6	ε	70 Ga Sallium	115 In	204 T t Thallium 82		162 Dy Dysprosium 66	Californium 98
			ιΩ	+	65 Zn Zinc 31	Cd Cadmium 48	201 Hg Mercury 1		159 Tb Terbium 65	247 Bk Berkelium 97
					64 Cu Copper 30	108 Ag Silver	197 Au Gold		157 Gd adolinium	247 Cm
۵					S9 Nickel 29	106 Pd Palladium 47	195 Pt Platinum 79		152 Eu rropium	243 Am Americium 96
Group					59 Co	103 Rh rodium 46	192 Ir Iridium F		150 Sm Samarium Ei 63	Pu Pu
		T Hydrogen			56 Fe Iron 27	Ruthenium Rt 45	190 Os Osmium 777		147 Pm	Np Stunium
					Mn Manganese 25	Tc	186 Re shenium 76		Neodymium Prc 60	238 U Jranium 9
					52 Cr omium	Molybdenum Tec	184 W W Tungsten F		141 Pr eodymium	Pa Protactinium U
					51 Chr	Niobium Moi	Ta Tantalum T		Cerium Pras	232 Th Thorium Pro
					48 Tranium va	91 Zr N	178 Hafnium Ta 73		288	06
					22	94	* 72	Ac Actinium	မှ	 a = relative atomic mass X = atomic symbol b = proton (atomic) number
			a E	mni	S ⁶	89 ×	139 La nn Lanthanum 57	88	*58-71 Lanthanoid series 190-103 Actinoid series	a = relative atomic X = atomic symbol b = proton (atomic)
	=		4	Magnesium	Ca Calcium	Strontium 38	137 Ba Barium 56	226 Ra Radium	*58-71 Lanthanoid series	в Х
	_		Lithium 3 23	Na Sodium	39 K Potassium 19	Rubidium 37	Caesium 55	223 Fr Francium 87	*58-71 190-10	Key

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

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