Cambridge IGCSE[™]

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

February/March 2023 45 minutes

0653/12

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet Soft clean eraser Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has 16 pages. Any blank pages are indicated.

- **1** Which characteristics help to define a living organism?
 - **A** diffusion, movement, respiration
 - B excretion, nutrition, sensitivity
 - **C** excretion, reproduction, transpiration
 - **D** growth, inspiration, nutrition
- **2** Two pieces of potato are cut to have exactly the same mass and shape. The mass is measured and recorded.



One piece of potato is placed in water and the other piece is placed in concentrated salt solution.

They are both left for one hour.

The mass of each piece of potato is then measured again.

What happens to the mass of each piece of potato?

	mass of potato placed in water	mass of potato placed in concentrated salt solution
Α	decreases	decreases
В	decreases	increases
С	increases	decreases
D	increases	increases

3 The results of tests carried out on four food samples are shown.

sample	Benedict's test	iodine test	biuret test	
1	1	\checkmark	x	key
2	\checkmark	X	\checkmark	\checkmark = positive result
3	x	\checkmark	x	x = negative result
4	X	X	\checkmark	

Which two samples contain protein?

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

- 4 Which type of molecule is an enzyme?
 - A carbohydrate
 - B fat
 - **C** protein
 - D vitamin
- 5 What is the word equation for photosynthesis?
 - **A** carbon dioxide + water \rightarrow glucose + oxygen
 - **B** glucose + oxygen \rightarrow carbon dioxide + water
 - **C** oxygen + carbon dioxide \rightarrow glucose + water
 - **D** water + oxygen \rightarrow glucose + carbon dioxide
- 6 Which two nutrients are needed for healthy bone and tooth development?
 - A calcium and iron
 - B fibre and vitamin C
 - **C** fibre and vitamin D
 - **D** vitamin D and calcium
- 7 Which statement about all arteries is correct?
 - A They always contain oxygenated blood.
 - **B** They have many valves on their inner walls.
 - **C** They have a wide lumen.
 - **D** They transport blood away from the heart.
- 8 The table shows the differences in the composition of carbon dioxide, oxygen and water vapour for inspired and expired air.

Which row shows the most likely composition for human inspired and expired air?

	carbon dioxide %		oxygen %		water vapour %	
	inspired	expired	inspired	expired	inspired	expired
Α	4	0.04	21	16	1	1
В	0.04	4	21	16	1	6
С	0.04	4	16	21	6	1
D	4	0.04	16	21	6	6

9 Which descriptions of food molecules before and after chemical digestion are correct?

	food molecules before chemical digestion	food molecules after chemical digestion
Α	large and insoluble	small and soluble
В	large and soluble	small and insoluble
С	small and insoluble	large and soluble
D	small and soluble	large and insoluble

- 10 In which situations does the secretion of adrenaline increase?
 - 1 an athlete waiting for the starting signal at the beginning of a race
 - 2 a mother zebra seeing a lion moving towards her offspring
 - 3 a child about to fall asleep
 - **A** 1, 2 and 3 **B** 1 and 2 only **C** 1 only **D** 2 and 3 only
- **11** The diagram shows a section through a flower.



Which row identifies the labelled parts of the flower?

	Р	Q	R
Α	anther	ovary	stigma
В	anther	stigma	ovary
С	stamen	carpel	sepal
D	stamen	sepal	carpel

12 The diagram shows a food chain.

oak tree \rightarrow caterpillar \rightarrow robin \rightarrow hawk

Which term is correct for the hawk in this food chain?

- A primary consumer
- B producer
- **C** secondary consumer
- D tertiary consumer

13 Some of the processes involved in the carbon cycle are listed.

- 1 combustion
- 2 decomposition
- 3 fossilisation
- 4 photosynthesis

Which processes release carbon dioxide into the atmosphere?

Α	1, 2 and 3	В	1 and 2 only	С	2, 3 and 4	D	3 and 4 only
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14 The structures of three molecules are shown.





ethanol



methane

water

How many atoms are in each molecule?

	water	ethanol	methane
Α	2	3	2
в	2	4	5
С	3	3	2
D	3	9	5

- **15** Which symbol equation is balanced?
 - $\mathbf{A} \quad \mathsf{H}_2 \ + \ \mathsf{C}l_2 \ \rightarrow \ \mathsf{H}\mathsf{C}l$
 - $\textbf{B} \quad \text{Mg + 2HC} l \rightarrow \text{MgC} l_2 \text{ + } H_2$
 - $\textbf{C} \quad CH_4 \ \textbf{+} \ O_2 \ \rightarrow \ CO_2 \ \textbf{+} \ 2H_2O$
 - $\textbf{D} \quad Mg \ \textbf{+} \ O_2 \ \rightarrow \ 2MgO$
- **16** A student measures the initial temperature and the final temperature in four different reactions.

Which row shows the results for the most endothermic reaction?

	initial temperature /°C	final temperature /°C
Α	19	29
В	20	16
С	22	17
D	22	26

17 Which apparatus is used to determine the rate of reaction when magnesium reacts with dilute hydrochloric acid?







D



- **18** Which statement describes a redox reaction?
 - **A** An acid reacts with a base.
 - **B** Only oxidation takes place.
 - **C** Oxygen is transferred from one substance to another.
 - **D** Two substances are both reduced.
- 19 Which solid reacts with sulfuric acid to produce a gas?
 - A copper
 - B copper carbonate
 - C copper oxide
 - D copper sulfate
- **20** Some water is added to a coloured, powdered mixture. After shaking, a blue solution and a white solid are seen.



What does the powder contain?

- A sodium chloride and copper(II) oxide
- **B** sodium chloride and copper(II) sulfate
- **C** barium sulfate and copper(II) oxide
- **D** barium sulfate and copper(II) sulfate
- **21** Which trend is shown by the elements across a complete period of the Periodic Table, from left to right?
 - **A** metals \rightarrow non-metals
 - $\textbf{B} \quad \text{metals} \rightarrow \text{non-metals} \rightarrow \text{metals}$
 - $\textbf{C} \quad \text{non-metals} \rightarrow \text{metals}$
 - $\textbf{D} \quad \text{non-metals} \rightarrow \text{metals} \rightarrow \text{non-metals}$

22 Which row describes a noble gas?

	type of particle	reactivity
Α	diatomic	high
в	diatomic	low
С	monatomic	high
D	monatomic	low

- 23 Which statement about the extraction of metals is correct?
 - **A** Aluminium is extracted from aluminium oxide by heating with carbon.
 - **B** Aluminium is less reactive than copper so aluminium can be extracted by electrolysis.
 - **C** Carbon can be used to remove oxygen from copper(II) oxide.
 - **D** Copper is extracted from the ore bauxite.
- 24 Which colour change is seen when water is added to anhydrous cobalt(II) chloride?
 - A white to blue
 - B pink to blue
 - C blue to white
 - D blue to pink
- 25 Which statements about air pollutants are correct?
 - 1 Sulfur dioxide can damage buildings.
 - 2 Oxides of nitrogen are harmful to health.
 - 3 Carbon monoxide is a poisonous gas.
 - 4 Carbon monoxide can damage buildings.
 - **A** 1, 2 and 3 **B** 1 and 2 only **C** 2, 3 and 4 **D** 3 and 4 only
- **26** Ethane is a hydrocarbon.

What are the products of the complete combustion of ethane?

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

- 27 What is produced by cracking?
 - A alkenes
 - **B** fractions
 - **C** naphtha
 - **D** polymers
- **28** The period of a pendulum is 3.0 s.

Which stop-watch shows the time for 15 periods of the pendulum?



29 A feather is falling through the air. Air resistance acts on the feather. In which unit is air resistance measured?

A Ω **B** kg **C** m/s **D** N

30 A solid object floats on a liquid if its density is less than that of the liquid.

A solid object has a mass of 350 g and a volume of 500 cm^3 .

The densities of three liquids are shown.

liquid	density g/cm ³
diesel	0.86
ethanol	0.79
petrol (gasoline)	0.68

On which liquids does the solid object float?

- A diesel and ethanol only
- **B** diesel and petrol only
- **C** ethanol and petrol only
- D diesel, ethanol and petrol
- 31 Which object has a resultant force acting on it?
 - A a book at rest on a table
 - **B** a car travelling up a hill in a straight line at constant speed
 - **C** a football moving upwards freely after being kicked
 - **D** a parachutist descending vertically at constant speed

32 An object is falling in a vacuum.

As the object falls, it passes through points P, Q and R.



Which statement describes the total quantity of energy of the object as it falls?

- **A** It is greatest at point P.
- **B** It is greatest at point Q.
- **C** It is greatest at point R.
- **D** It is the same at points P, Q and R.
- 33 Which statement explains why wind energy is called a renewable source of energy?
 - A It is continuously replaced from natural sources.
 - **B** It does not cause pollution.
 - **C** It is only available at certain times.
 - **D** It provides a large quantity of energy.
- **34** A girl holds a thick glass beaker and pours hot water into it.

There is a noticeable delay before she feels the thermal energy from the water reaching her hand.

Which statement explains this delay?

- **A** Glass is a bad thermal conductor.
- **B** Glass is a good thermal conductor.
- **C** Water is a bad thermal conductor.
- **D** Water is a good thermal conductor.

35 In which states of matter can convection occur?

	in a solid	in a liquid	in a gas
Α	no	no	yes
В	no	yes	yes
С	yes	no	no
D	yes	yes	no

36 A ray of light in air is incident on a glass block. The ray of light is refracted as it enters the glass block and as it emerges from the glass block.

Which diagram shows the complete path of the light ray?



37 The diagram shows the order of the lowest frequency of sound that can be heard by some animals.

Which labelled position shows the lowest frequency that can be heard by humans with healthy ears?



38 A charged sphere is suspended by an insulating thread.

A positively charged rod is moved close to the sphere.

The sphere is deflected as shown.



What is the charge on the sphere and why is the sphere deflected?

	charge on the sphere	reason for deflection
Α	negative	like charges repel
В	negative	unlike charges repel
С	positive	like charges repel
D	positive	unlike charges repel

39 Which circuit is used to measure the current in a lamp and the potential difference (p.d.) across the lamp?









40 When a computer is switched on, the current increases quickly to 3.1A and then decreases slowly to a steady value of 1.0 A when the computer is in use.

The cable connecting the computer to the power supply can safely carry a current of 10.0 A.

The circuit contains a fuse.

Which fuse rating is used to provide suitable protection?

A 1A **B** 3A **C** 5A **D** 13A

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The Periodic Table of Elements

							-			-							-						
Group	= N	² He	helium 4	10	Ne	neon 20	18	Ar	argon 40	36	х	krypton	64	54	Xe	xenon 131	86	Rn	radon -	118	Og	oganesson	I
	</td <td></td> <td></td> <td>6</td> <td>ш</td> <td>fluorine 19</td> <td>17</td> <td>Cl</td> <td>chlorine 35.5</td> <td>35</td> <td>Ъ</td> <td>bromine</td> <td>00</td> <td>53</td> <td>Ι</td> <td>iodine 127</td> <td>85</td> <td>At</td> <td>astatine -</td> <td>117</td> <td>Ts S</td> <td>tennessine</td> <td>I</td>			6	ш	fluorine 19	17	Cl	chlorine 35.5	35	Ъ	bromine	00	53	Ι	iodine 127	85	At	astatine -	117	Ts S	tennessine	I
	N			8	0	oxygen 16	16	ა	sulfur 32	34	Se	selenium	13	52	Te	tellurium 128	84	Ро	polonium –	116	2	livermorium	I
	>			7	z	nitrogen 14	15	۵.	phosphorus 31	33	As	arsenic	c/	51	Sb	antimony 122	83	Bi	bismuth 209	115	Mc	moscovium	I
	2			9	ပ	carbon 12	14	Si	silicon 28	32	Ge	germanium	5	50	Sn	tin 119	82	Pb	lead 207	114	Fl	flerovium	I
	≡			5	В	boron 11	13	Ρl	aluminium 27	31	Ga	gallium	0,	49	In	indium 115	81	11	thallium 204	113	ЧN	nihonium	I
										30	Zn	zinc	co	48	S	cadmium 112	80	Hg	mercury 201	112	C	copernicium	I
										29	Cu	copper	04	47	Ag	silver 108	79	Au	gold 197	111	Rg	roentgenium	I
										28	ïZ	nickel	80	46	Ъd	palladium 106	78	ħ	platinum 195	110	Ds	darmstadtium	I
										27	ပိ	cobalt	PC .	45	Rh	rhodium 103	77	Ir	iridium 192	109	Mt	meitnerium	I
		+ H	hydrogen 1							26	Fе	iron	oc	44	Ru	ruthenium 101	76	Os	osmium 190	108	Hs	hassium	I
										25	Mn	manganese	с <u>с</u>	43	ЪС	technetium -	75	Re	rhenium 186	107	Bh	bohrium	I
					loc	SS				24	ŗ	chromium	70	42	Mo	molybdenum 96	74	>	tungsten 184	106	Sg	seaborgium	I
			Key	atomic number	atomic symb	name itive atomic ma				23	>	vanadium	0	41	qN	niobium 93	73	Та	tantalum 181	105	Db	dubnium	I
						rela				22	i	titanium	6	40	Zr	zirconium 91	72	Ħ	hafnium 178	104	Rf	rutherfordium	I
										21	Sc	scandium	64	39	≻	yttrium 89	57-71	lanthanoids		89-103	actinoids		
	=			4	Be	beryllium 9	12	Mg	magnesium 24	20	Ca	calcium	40	38	ي ک	strontium 88	56	Ba	barium 137	88	Ra	radium	I
	_			e	:	lithium 7	11	Na	sodium 23	19	×	potassium	38	37	Rb	rubidium 85	55	Cs	caesium 133	87	г	francium	I

lawrencium 71 Lu Iutetium 175 103 Lr 70 Yterbium 173 102 No nobelium mendelevium 69 Tm 169 101 Md 68 erbium 167 100 Fm femium 67 holmium 165 99 einsteinium \hat{G}^{00}_{163} califomium 65 Tb 159 97 97 berkelium adolinium 157 96 CM curium ⁶⁴ Gd 63 Eu europium 152 95 Am menicium 94 PU plutonium Sm 82 93 **Np** Ieptunium romethium Pm ⁶ 92 U uranium 238 ⁰⁹ Nd praseodymium 141 91 **Pa** protactinium 231 Pr 59 58 Centum 140 90 90 90 232 232 57 La lanthanum 139 89 89 AC lanthanoids actinoids

The volume of one mole of any gas is $24\,dm^3$ at room temperature and pressure (r.t.p.).

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