# Cambridge IGCSE<sup>™</sup>

# **COMBINED SCIENCE**

Paper 1 Multiple Choice (Core)

October/November 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 12 pages.

- **1** What is osmosis?
  - **A** the movement of salt across a cell wall
  - B the movement of salt across a partially permeable membrane
  - **C** the movement of water across a cell wall
  - D the movement of water across a partially permeable membrane
- 2 Which row shows the elements that make up proteins?

	carbon	hydrogen	nitrogen	oxygen
Α	$\checkmark$	X	$\checkmark$	x
в	$\checkmark$	$\checkmark$	X	x
С	X	$\checkmark$	X	$\checkmark$
D	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$

- 3 What are enzymes made from?
  - A fat
  - **B** protein
  - C starch
  - D oil
- 4 Which row correctly matches an organ of the alimentary canal with its functions?

	organ	absorption	digestion	egestion	ingestion
Α	large intestine	yes	no	no	yes
В	oesophagus	no	yes	yes	no
С	small intestine	yes	yes	no	no
D	stomach	no	no	yes	yes

- 5 Which process is defined as taking substances into the body through the mouth?
  - **A** absorption
  - **B** digestion
  - **C** egestion
  - **D** ingestion

6 The apparatus shown can be used to measure the rate of transpiration.



Four identical sets of apparatus were set up under different environmental conditions and left for 1 hour.

In all four apparatus, the air bubble was at the 5.0 cm point at the start of the experiment.

What would be the reading on the scale of the apparatus that was left in low humidity and high temperature?

Α	1.5 cm	В	5.0 cm	<b>C</b> 7.0 cm	<b>D</b> 9.5 cm
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7 A student is investigating the differences in composition of samples of inspired and expired air.

What can he use to test for carbon dioxide?

- A biuret solution
- B limewater
- **C** ethanol
- **D** iodine solution
- 8 What is the word equation for aerobic respiration?
  - A carbon dioxide + water  $\rightarrow$  glucose + oxygen
  - **B** glucose  $\rightarrow$  carbon dioxide + water
  - **C** oxygen + carbon dioxide  $\rightarrow$  glucose + water
  - **D** glucose + oxygen  $\rightarrow$  carbon dioxide + water

- 9 Which statement about the growth response of plant roots is correct?
  - **A** They grow away from gravity and away from light.
  - **B** They grow away from gravity and towards light.
  - **C** They grow towards gravity and away from light.
  - **D** They grow towards gravity and towards light.
- 10 Which row describes asexual reproduction?

	number of parents	a zygote is produced	offspring genetically identical to the parent
Α	1	no	yes
В	1	yes	no
С	2	no	yes
D	2	yes	no

- 11 Which statement describes fertilisation in a flowering plant?
  - **A** fusion of a pollen nucleus with a nucleus in the ovule
  - **B** fusion of a pollen nucleus with the stigma
  - **C** transfer of a pollen grain from the anther to the stigma
  - **D** transfer of a pollen grain from the filament to the stigma
- **12** The diagram shows the human male reproductive system.

Which labelled part is the prostate gland?



**13** The diagram shows part of the carbon cycle.

Which arrow represents respiration by decomposers?



**14** Substance X is an element.

It is a gas at room temperature.

It is made of X<sub>2</sub> molecules.

# Which diagram represents X?



- **15** Which statement about tap water is correct?
  - A It is a compound.
  - **B** It is a mixture of elements.
  - **C** It is a pure substance.
  - **D** It is a solution.
- **16** Compound X contains one iron atom.

It also contains the same number of sulfur atoms as iron atoms and four times as many oxygen atoms as sulfur atoms.

What is the formula of compound X?

	Α	Fe(SO) <sub>4</sub>	В	FeSO <sub>4</sub>	С	FeS₄O	D	Fe <sub>4</sub> S <sub>4</sub> O
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17 When solid sodium carbonate and dilute hydrochloric acid are mixed, a reaction occurs.

During this reaction, carbon dioxide is released and the temperature of the mixture increases.

Which chemical terms describe this reaction?

- 1 exothermic
- 2 neutralisation
- 3 thermal decomposition
- **A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only
- 18 In which row do all of the changes shown increase the rate of reaction?

	temperature	concentration	particle size
Α	decrease	increase	decrease
В	decrease	decrease	increase
С	increase	increase	decrease
D	increase	decrease	increase

**19** Iron is extracted from its ore using carbon monoxide.

The word equation is shown.

iron(III) oxide + carbon monoxide  $\rightarrow$  iron + carbon dioxide

Which statement is correct?

- A Carbon monoxide is oxidised by gaining oxygen.
- **B** Carbon monoxide is reduced by losing oxygen.
- **C** Iron(III) oxide is oxidised by losing oxygen.
- **D** Iron(III) oxide is reduced by gaining oxygen.

**20** Dilute hydrochloric acid is added to powdered solid X.

Hydrogen gas is produced.



What is X?

- A zinc
- **B** zinc carbonate
- **C** zinc hydroxide
- D zinc oxide
- 21 Which test is used to identify ammonia?
  - A A glowing splint relights.
  - **B** Damp blue litmus paper is bleached.
  - **C** Damp red litmus paper turns blue.
  - **D** Limewater turns milky.
- 22 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.

**23** Hydrogen peroxide decomposes slowly to produce water and oxygen.

Element X and a compound of element X cause hydrogen peroxide to decompose more rapidly.

What is the position of element X in the Periodic Table?

Α							В		
			С						D

- 24 Which substance does not react with dilute hydrochloric acid to produce copper chloride?
  - A copper
  - B copper carbonate
  - C copper hydroxide
  - D copper oxide

# **25** Which gases are greenhouse gases?

- **A** carbon dioxide and methane
- **B** carbon dioxide and oxygen
- C methane and nitrogen
- **D** nitrogen and oxygen
- 26 Decane is an alkane.

Which statement about decane is correct?

- **A** It burns in air to form carbon dioxide and hydrogen.
- **B** It is an unsaturated hydrocarbon.
- **C** It only contains single C–C and C–H bonds.
- **D** It rapidly decolourises bromine water.

27 Which process is used to produce alkenes?

**A** addition polymerisation

**B** combustion

- **C** cracking
- **D** fractional distillation
- 28 An object travels 6.0 km in two minutes.

What is its speed?

	0.050 mm / m	P	0.0 /	•	F0 / -		2000 / -
A	0.050 m/s	D	3.0 m/s		50 m/ s	U	3000 m/s

**29** The graph shows how the speed of a moving car varies with time.



Which statement about the car is correct?

- **A** The car is accelerating.
- **B** The car is at rest at time = 0.
- **C** The car must be travelling in a straight line.
- **D** The car travels equal distances in equal times.
- **30** The gravitational field strength on the planet Mercury is 3.7 N/kg.

What is the weight of a 10 kg rock on Mercury?

**A** 0.37N **B** 3.7N **C** 10N **D** 37N

**31** A car has an initial kinetic energy of 120 kJ at the bottom of a slope. The car is driven up the slope. At the top of the slope, the car has 260 kJ of kinetic energy and has gained 570 kJ of gravitational potential energy.

What is the total increase in kinetic energy and gravitational potential energy of the car as it moves up the slope?

**A** 430 kJ **B** 710 kJ **C** 830 kJ **D** 950 kJ

- 32 Which statement about the boiling point of a substance is correct?
  - **A** At all temperatures above its boiling point, a substance must be a gas.
  - **B** At all temperatures above its boiling point, a substance must be a liquid.
  - **C** At all temperatures below its boiling point, a substance must be a gas.
  - **D** At all temperatures below its boiling point, a substance must be a liquid.
- **33** A student puts an object made of metal and another object made of plastic in the same freezer for several days.

The student removes the two objects from the freezer.

When the student touches the objects, the metal one feels colder than the plastic one.

Why is this?

- **A** The metal conducts heat quickly away from the hand.
- **B** The metal is at a lower temperature than the plastic.
- **C** The plastic conducts heat quickly into the hand.
- **D** The plastic has a lower melting point than the metal.
- 34 What is a use of microwaves?
  - A checking for broken bones
  - **B** satellite television
  - C tanning lamps
  - **D** television remote controllers
- **35** A loudspeaker vibrates at different frequencies.

Which frequency of vibration does not produce a sound that a human can hear?

Α	60 Hz	В	600 Hz	С	6.0 kHz	D	60 kHz
A	00 HZ	D	000 HZ	C	0.0 KHZ	υ	

**36** A potential difference (p.d.) of 6.0 V is applied across a lamp.

The current in the lamp is 1.5 A.

What is the resistance of the lamp?

**A**  $0.25\Omega$  **B**  $4.0\Omega$  **C**  $4.5\Omega$  **D**  $9.0\Omega$ 

**37** A plastic rod is rubbed with a woollen cloth. The rod becomes negatively charged.

What happens to the woollen cloth?

- A It gains electrons and becomes negatively charged.
- B It gains electrons and becomes positively charged.
- **C** It loses electrons and becomes negatively charged.
- **D** It loses electrons and becomes positively charged.
- **38** A battery is connected to a heater, an ammeter and a voltmeter.

The ammeter measures the current in the heater.

The voltmeter measures the potential difference across the heater.

Which diagram shows this circuit?



**39** What is the circuit symbol for a component whose only purpose is to protect an electric circuit?



- **40** Which risk is increased by using electrical equipment in damp conditions rather than in dry conditions?
  - **A** the cable to the equipment overheating
  - **B** the equipment overheating
  - **C** the current becoming too low
  - **D** the person receiving an electric shock

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The Periodic Table of Elements

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	-						-							-	-		2
							т										He
				Key			hydrogen 1										helium 4
3	4		9	tomic number		L						5	9	7	8	6	10
	Be		atoi	mic symt	loc							Ш	ပ	z	0	ш	Ne
lithium ber 7	ryllium Q		relat	name tive atomic ma	00							boron 11	carbon	nitrogen 1.4	oxygen 16	fluorine 1 Q	neon
- =	12											13	14	15	16	17	18
Na	Ng											Al	Si	٩	ი	Cl	Ar
sodium mag 23	jnesium 24											aluminium 27	silicon 28	phosphorus 31	sulfur 32	chlorine 35.5	argon 40
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
×	Ca	Sc	F	>	ŗ	Mn	Ъe	ပိ	ïZ	Cu	Zn	Ga	Ge	As	Se	Ъ	Кr
potassium cc 39	alcium 40	scandium 45	titanium 48	vanadium 51	chromium 52	manganese 55	iron 56	cobalt 59	nickel 59	copper 64	zinc 65	gallium 70	germanium 73	arsenic 75	selenium 79	bromine 80	krypton 84
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Rb	ي ا	≻	Zr	qN	Mo	Ъс	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Те	Ι	Xe
rubidium str. 85	ontium 88	yttrium 89	zirconium 91	niobium 93	molybdenum 96	technetium -	ruthenium 101	rhodium 103	palladium 106	silver 108	cadmium 112	indium 115	tin 119	antimony 122	tellurium 128	iodine 127	xenon 131
55	56	57-71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
Cs	Ba	anthanoids	μ	Та	8	Re	SO	Ir	ъ	Au	Hg	11	РЬ	Bi	Ъо	At	Rn
caesium bi	arium 137		hafnium 178	tantalum 181	tungsten 184	rhenium 186	osmium 190	iridium 192	platinum 195	gold 197	mercury 201	thallium 204	lead 207	bismuth 209	polonium –	astatine 	radon -
87	88	89-103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
Fr Fr	За	actinoids	Ŗ	Db	Sg	Bh	Hs	Mt	Ds	Rg	C	ЧN	Fl	Mc	۲<	Ts S	Og
francium rs	adium -		rutherfordium -	dubnium –	seaborgium -	bohrium –	hassium -	meitnerium -	darmstadtium -	roentgenium -	copernicium -	nihonium –	flerovium -	moscovium –	livermorium -	tennessine -	oganesson -
	L	57	58	20	60	61	62	63	64	65	99 99	67	68	60	20	71	
anthanoids		La	o B O	ያ	Nd S	Pm	Sm	Eu	b D	<sup>2</sup> Tb	<sup>3</sup> D	, eH	ЗШ	g T	γp	Γn	
		lanthanum 139	cerium 140	praseodymium 141	neodymium 144	promethium -	samarium 150	europium 152	gadolinium 157	terbium 159	dysprosium 163	holmium 165	erbium 167	thulium 169	ytterbium 173	lutetium 175	
		89	06	91	92	93	94	95	96	97	98	66	100	101	102	103	
actinoids		Ac	Th	Ра	⊃	Np	Pu	Am	Cm	¥	Ç	Es	Еm	Md	No	Ļ	

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70 Yterbium 173 102 NO nobelium mendelevium 69 Tm 169 Md 68 Er 167 100 Fm femium 67 holmium 165 99 ES  $G_{\rm dysprosium}^{\rm dysprosium}$ californium 65 Tb 159 97 97 berkelium 64 Gd 157 157 157 157 -The volume of one mole of any gas is  $24\,dm^3$  at room temperature and pressure (r.t.p.). 63 Eu 152 95 95 menicium 62 Sm 150 94 94 Du 93 Np Ieptunium 144 92 U uranium 238 protactinium 141 91 **Pa** 231 231 thorium 232 58 Ce 140 90 90 140 57 La anthanum 139 89 89 AC actinoids

lanthanoids

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