Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/22**

Paper 2 Multiple Choice (Extended) **May/June 2025**

45 minutes

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.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

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 Movement is a characteristic of all living organisms.

Which two other characteristics of living organisms provide the energy for movement?

A excretion and nutrition

B growth and sensitivity

C nutrition and respiration

D respiration and growth

2 Which plant cell structure matches its function?

	structure	function
A	cell membrane	provides strength and support
B	chloroplast	absorbs light energy
C	ribosome	provides protection
D	vacuole	site of chemical reactions

3 Which row describes osmosis?

	osmosis is the net movement of water molecules through a partially permeable membrane	
	from	to
A	a dilute solution with a higher water potential	a concentrated solution with a lower water potential
B	a concentrated solution with a higher water potential	a dilute solution with a lower water potential
C	a dilute solution with a lower water potential	a concentrated solution with a higher water potential
D	a concentrated solution with a lower water potential	a dilute solution with a higher water potential

4 The table shows the results of tests carried out on different food samples.

food sample	ethanol emulsion test	biuret test	Benedict's solution test
1	✗	✓	✗
2	✓	✗	✗
3	✗	✓	✓
4	✓	✗	✓

key
✓ = positive result
✗ = negative result

Which food samples contain reducing sugar?

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

5 Which statement describes enzyme action in humans?

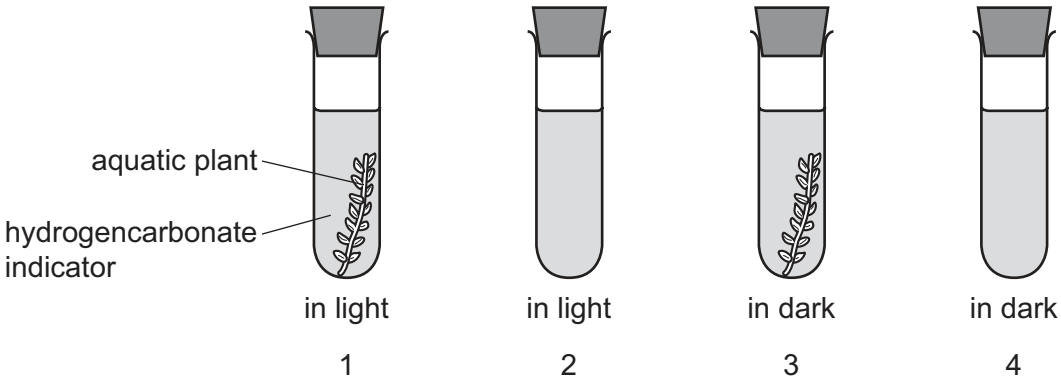
A Enzymes become denatured at 0 °C.

B The activity of enzymes always increases with an increasing temperature.

C The enzyme active site and its substrate are the same shape.

D There are more-frequent effective collisions when the temperature increases from 20 °C to 30 °C.

6 Four tubes that contain red hydrogencarbonate indicator are set up as shown. After five hours, the colour of the hydrogencarbonate indicator is recorded.



Which row shows the colour of the hydrogencarbonate indicator in each tube after five hours?

	1	2	3	4
A	purple	red	red	red
B	purple	red	yellow	red
C	red	yellow	red	purple
D	yellow	red	purple	red

7 A diet provides the correct energy requirements for a person but is **not** balanced.

What are possible effects of this diet?

1 constipation

2 obesity

3 scurvy

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

8 What is a function of hydrochloric acid in the stomach?

A to help absorption of all food in the stomach

B to kill microorganisms in the ingested food

C to prevent chemical digestion

D to prevent the stomach contents being too acidic

9 Which statement explains why root hair cells have a long, thin shape?

A They are squeezed into this shape as they grow between soil particles.

B It is the most efficient shape for taking up food such as glucose.

C It provides a large surface area for diffusion of water.

D The narrow diameter allows them to gain carbon dioxide from between soil particles.

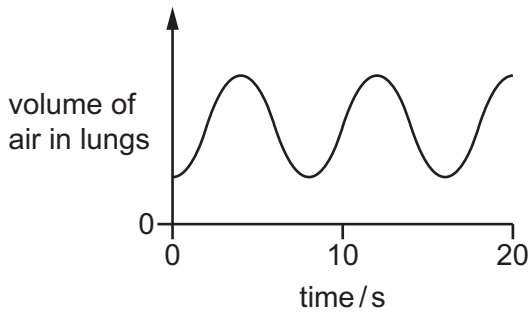
10 Which row describes viruses?

	are pathogens	have a protein coat	contain genetic material
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✗	✓

11 The graphs show how the rate and depth of breathing varies when a student does four different activities.

Which graph shows when the student is most active?

A



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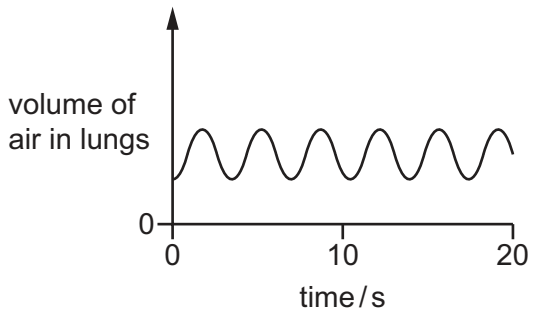

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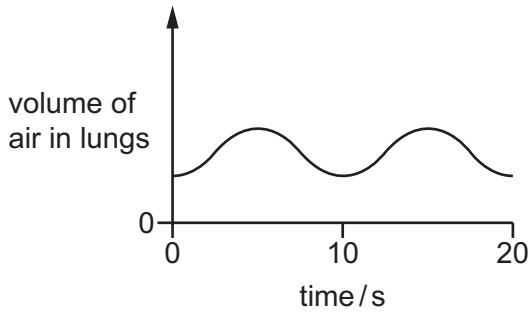

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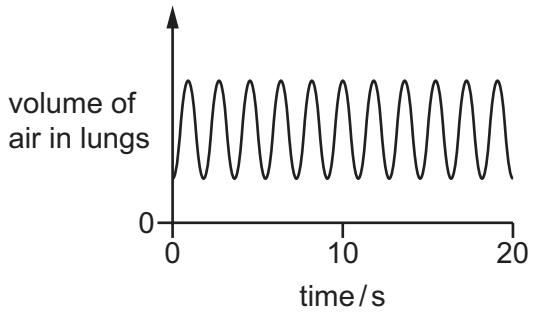


12 Which statement about the use of antibiotics is correct?

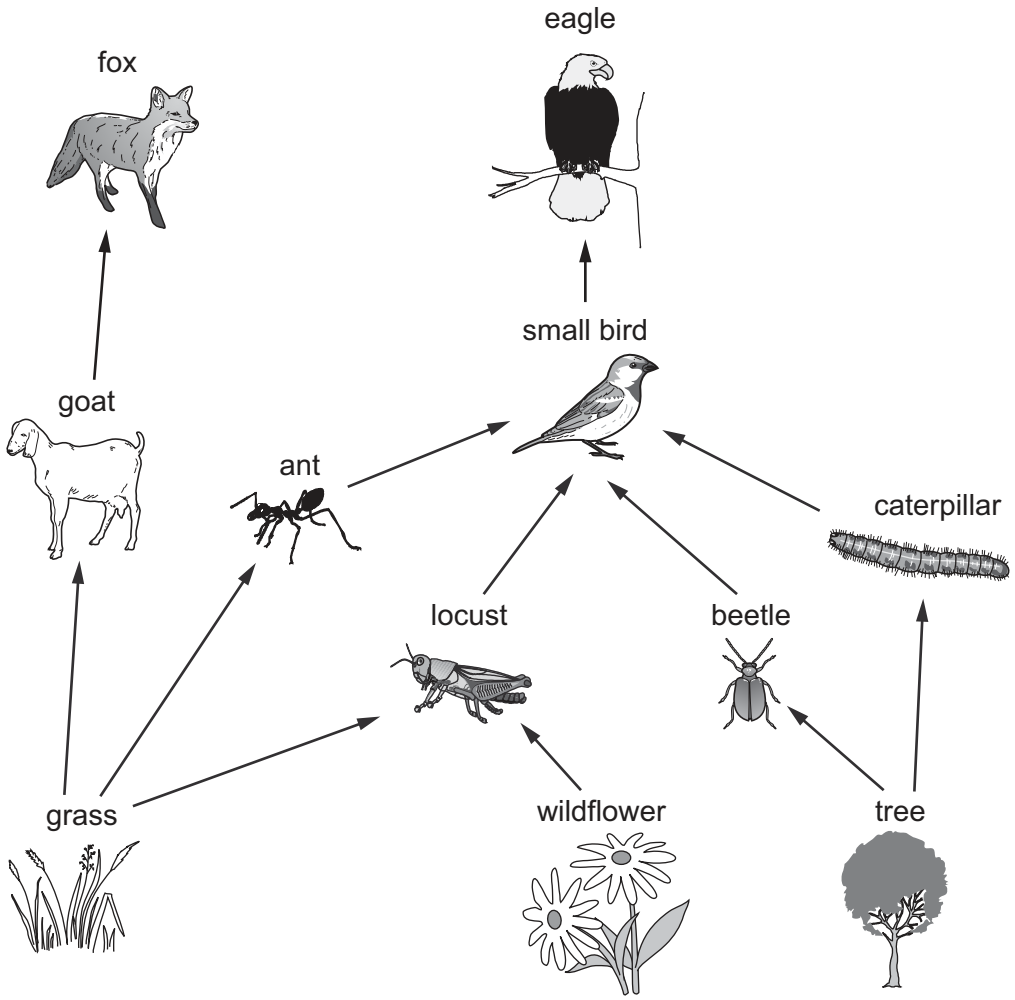
A Overuse of antibiotics causes the development of bacteria such as MRSA.

B Antibiotics are prescribed for infections caused by viruses and bacteria.

C Antibiotics increase reproduction of non-resistant bacteria.

D Antibiotics only kill resistant bacteria.

13 The diagram shows a food web.



Which row states the number of species of each category in this food web?

	number of primary consumer species	number of secondary consumer species	number of tertiary consumer species
A	6	1	1
B	5	2	1
C	5	2	2
D	3	4	3

14 The table describes three changes of state, W, X and Y.

change of state	particle arrangement	particle motion	energy
W	further apart and random	faster	increases
X	closer together and random	slower	decreases
Y	closer together and regular	vibration	decreases

Which statement about the changes of state is correct?

A W is melting and Y is condensing.

B X is evaporating and W is condensing.

C Y is freezing and W is evaporating.

D W is melting and X is freezing.

15 Which statement describes a substance that contains covalent bonds?

A It is a coloured compound that contains a transition element.

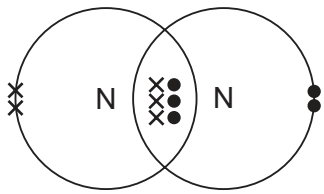
B It is a good conductor of electricity when molten.

C It is a compound formed from two non-metallic elements.

D It can be broken down by the passage of an electric current.

16 Which dot-and-cross diagram represents the arrangement of outer-shell electrons in a molecule of nitrogen?

A



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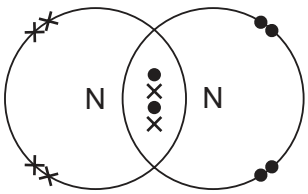

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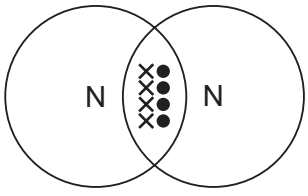

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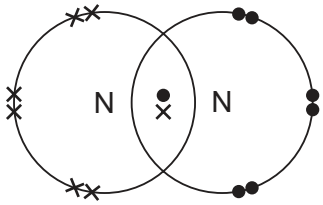


17 Which statement explains why a reaction is exothermic?

A More thermal energy is absorbed by breaking bonds than is released by making bonds.

B More thermal energy is absorbed by making bonds than is released by breaking bonds.

C More thermal energy is released by breaking bonds than is absorbed by making bonds.

D More thermal energy is released by making bonds than is absorbed by breaking bonds.

18 Which statement explains why the rate of a reaction is greater at a higher temperature?

A The activation energy is higher.

B More colliding particles have the minimum energy to react.

C The frequency of collisions between reacting particles decreases.

D There are more reacting particles per unit volume.

19 Which word equation represents the reaction of an acid with a carbonate?

A acid + carbonate → salt + carbon dioxide

B acid + carbonate → salt + carbon dioxide + water

C acid + carbonate → salt + hydrogen + water

D acid + carbonate → salt + water

20 Which row describes the physical state of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

21 Which statement explains why all Group VIII elements are unreactive?

A They all have a complete outer shell of electrons.

B They all have only two electrons in their outer shell.

C They all have eight electrons in their outer shell.

D They all have no electrons in their outer shell.

22 Which element does **not** produce a gas when added to dilute hydrochloric acid?

A copper

B iron

C magnesium

D zinc

23 Which row describes the extraction of iron from its ore?

	name of ore	method of extraction
A	bauxite	electrolysis
B	bauxite	reduction in a blast furnace
C	hematite	electrolysis
D	hematite	reduction in a blast furnace

24 Which process is a physical change?

A combustion of solid carbon

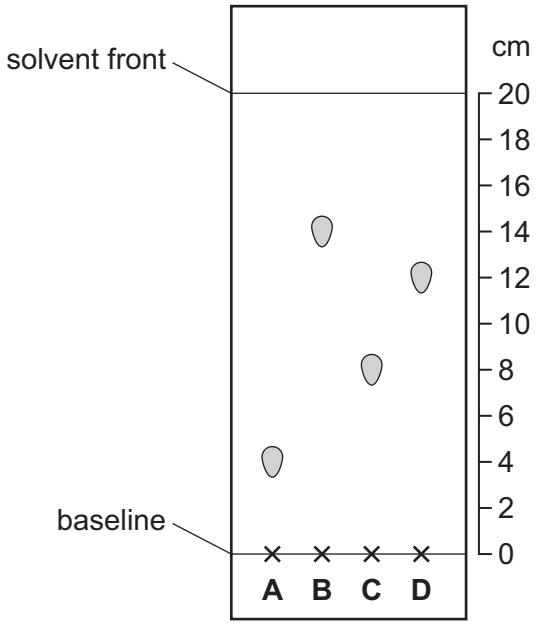
B cracking of an alkane to give an alkene

C fractional distillation of petroleum

D rusting of iron

25 The chromatogram of four different substances is shown.

Which substance has an R_f value of 0.6?



26 Potassium iodide reacts with lead(II) nitrate to produce yellow lead(II) iodide and potassium nitrate.

$$2KI(aq) + Pb(NO_3)_2(aq) \rightarrow PbI_2(s) + 2KNO_3(aq)$$

Which row describes this reaction and how to separate lead(II) iodide from the reaction mixture?

	reaction	separation
A	neutralisation	chromatography
B	neutralisation	filtration
C	precipitation	chromatography
D	precipitation	filtration

27 Which row shows an electrolyte and the products of electrolysis for this electrolyte?

	electrolyte	products
A	concentrated aqueous sodium chloride	sodium and chlorine
B	molten potassium bromide	hydrogen and bromine
C	molten sodium chloride	sodium and chlorine
D	dilute sulfuric acid	hydrogen and sulfur dioxide

28 The diagram shows the horizontal forces acting on a car of mass 1200 kg.

What is the acceleration of the car?

A $0.25\,m/s^2$ **B** $0.75\,m/s^2$ **C** $1.3\,m/s^2$ **D** $4.0\,m/s^2$

29 A brick of mass 2.0 kg rests on a platform at a height of 15 m above the ground.

The brick falls to the ground.

The gravitational field strength *g* is 9.8 N / kg.

What is the speed of the brick as it hits the ground?

A 12 m / s **B** 17 m / s **C** 150 m / s **D** 290 m / s

30 Which process is the source of the energy released from the Sun?

A chemical reactions

B geothermal heating

C nuclear fission

D nuclear fusion

31 What is a property of both solids and liquids?

A They always fill a container.

B They can flow.

C They have a fixed shape.

D They have a fixed volume.

32 Which material is a good thermal conductor?

A copper

B glass

C plastic

D wood

33 A room contains cold air.

An electric heater is used to warm the air.

Which statement explains why the warm air rises?

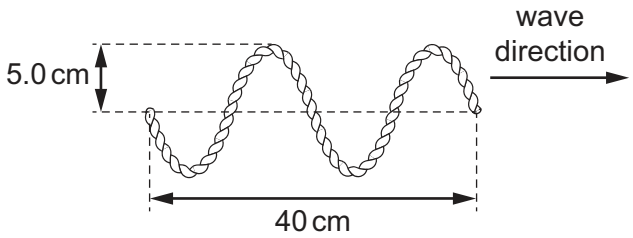
A Air contracts as it is warmed.

B Particles in warm air have less energy than particles in cold air.

C The mass of the air particles decreases as the air is warmed.

D Warm air is less dense than cold air.

34 A student vibrates the end of a horizontal rope and sends a wave along the rope. The wave is shown in the diagram.



Which row shows the amplitude of the wave and the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	5.0	10
B	5.0	20
C	10	10
D	10	20

35 Which description of the image of an object in a plane mirror is correct?

A real and smaller than the object

B real and the same size as the object

C virtual and smaller than the object

D virtual and the same size as the object

36 What is the speed of infrared waves in a vacuum?

A 3.0 m / s

B 330 m / s

C 3.0×10^8 m / s

D 330×10^8 m / s

37 Two charged rods, X and Y, are brought, one at a time, close to positively charged rod Z.

Rod Z is repelled by rod X. Rod Z is attracted by rod Y.

Which row shows the charges on rods X and Y?

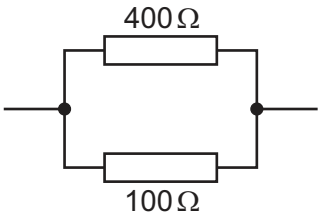
	charge on rod X	charge on rod Y
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

38 There is a current of 2.0 A in a resistor of resistance 2.0 Ω.

How much charge flows through the resistor in 4.0 s?

A 0.50 C **B** 2.0 C **C** 8.0 C **D** 16 C

39 A 400 Ω resistor and a 100 Ω resistor are connected in parallel.



What is the combined resistance of the two resistors?

A 40 Ω **B** 80 Ω **C** 250 Ω **D** 500 Ω

40 An object orbits a planet. The period of the orbit is 8.0 hours. The speed of the object is 2.0 km / s.

What is the radius of the orbit?

A 1.5×10^5 m **B** 9.2×10^6 m **C** 2.9×10^7 m **D** 3.6×10^8 m

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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