



Cambridge IGCSE™

COMBINED SCIENCE

Paper 2 Multiple Choice (Extended)

0653/22

May/June 2023

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.

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.

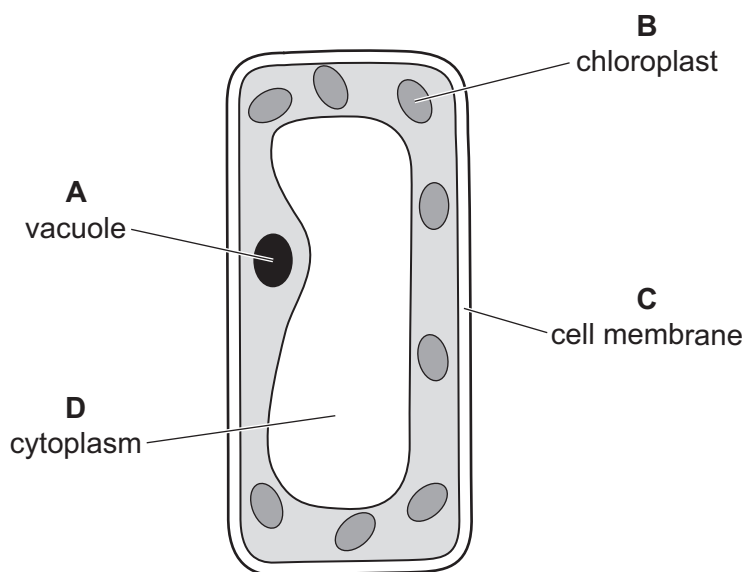


1 Which process removes toxic materials from an organism?

- A digestion
- B egestion
- C excretion
- D respiration

2 The diagram shows a cell as seen with a microscope.

Which label is correct?



3 The activity of an enzyme-catalysed reaction is altered by changes in temperature.

What occurs when the temperature rises above the temperature at which the enzyme works best?

- A The shape of the substrate molecule no longer fits the active site of the enzyme molecule.
- B The increasing temperature causes the substrate molecules to break down.
- C The concentration of the substrate increases and that of the product decreases.
- D The kinetic energy of the substrate particles decreases.

- 4 In plants, photosynthesis takes place in the leaf.

During photosynthesis,P..... transfersQ..... energy intoR..... energy. This is used for the synthesis ofS..... .

Which row correctly completes gaps P, Q, R and S?

	P	Q	R	S
A	chlorophyll	chemical	light	carbohydrate
B	chlorophyll	light	chemical	carbohydrate
C	glucose	chemical	light	chlorophyll
D	glucose	light	chemical	chlorophyll

- 5 What can be caused by a diet containing too little vitamin C?

- A** anaemia
- B** coronary heart disease
- C** rickets
- D** scurvy

- 6 In which order does food pass through parts of the alimentary canal?

- A** oesophagus → anus → large intestine
- B** small intestine → oesophagus → stomach
- C** small intestine → large intestine → anus
- D** stomach → large intestine → small intestine

- 7 The table shows two processes that are involved in transpiration.

What happens to the rate of these processes in high humidity?

	diffusion of water vapour through stomata	evaporation of water from surfaces of mesophyll cells
A	rate decreases	rate increases
B	rate decreases	rate decreases
C	rate increases	rate increases
D	rate increases	rate decreases

- 8 A sample of blood is taken from a person who often gets infections.

The blood is also slow to clot.

Which blood components are likely to be at a lower level than normal?

- 1 platelets
- 2 red blood cells
- 3 white blood cells

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

- 9 In respiration, glucose is broken down to release energy.

Which row states how humans could use this energy?

	growth	keep a constant body temperature	muscle contraction	protein synthesis
A	✓	✓	✓	✓
B	✓	✓	x	✓
C	x	x	✓	✓
D	x	✓	✓	x

key

✓ = true

x = false

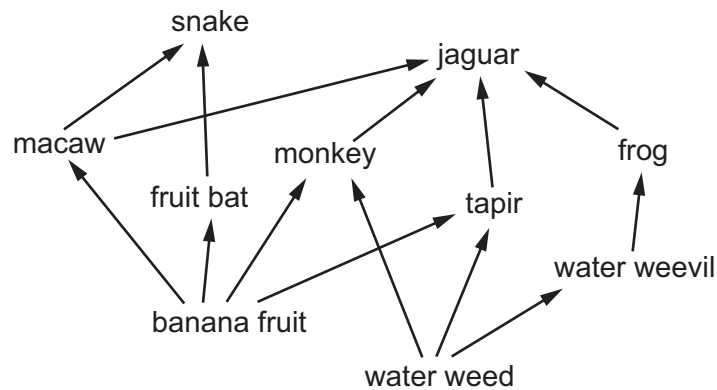
- 10 What happens when adrenaline is released into the blood?

	blood glucose concentration	pulse rate
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

- 11 Which row describes asexual reproduction?

	number of parents involved	offspring genetically identical to each other
A	1	yes
B	1	no
C	2	yes
D	2	no

12 The diagram shows part of a food web.



Which row gives the number of each type of consumer?

	primary	secondary	tertiary
A	2	2	0
B	2	5	3
C	5	1	0
D	5	3	1

13 Eutrophication of fresh water occurs because of a series of events in the water.

The list describes these events.

- 1 increased aerobic respiration by decomposers
- 2 increased availability of nitrate and other ions
- 3 increased decomposition after death of producers
- 4 increased growth of producers
- 5 reduction in amount of dissolved oxygen in the water

Which order of these events results in the death of fish and other aquatic organisms?

- A** 2 → 1 → 4 → 5 → 3
- B** 2 → 4 → 3 → 1 → 5
- C** 4 → 2 → 3 → 1 → 5
- D** 4 → 5 → 2 → 1 → 3

14 The formulae of three substances are shown.

substance	formula
methane	CH ₄
water	H ₂ O
oxygen	O ₂

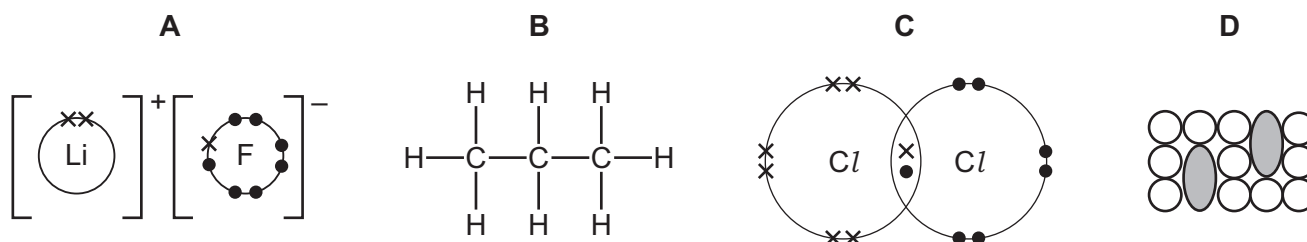
Which statement is correct?

- A Methane is made from five different types of atom.
- B Methane, water and oxygen are molecules.
- C Only methane and water are molecules.
- D Oxygen is made from two different types of atom.

15 What is the definition of nucleon number?

- A the number of protons in an atom
- B the number of electrons in an atom
- C the total number of electrons and neutrons in an atom
- D the total number of neutrons and protons in an atom

16 Which structure represents an ionic compound?



17 Aqueous lead(II) nitrate, Pb(NO₃)₂, reacts with aqueous potassium iodide to make a precipitate of lead(II) iodide.

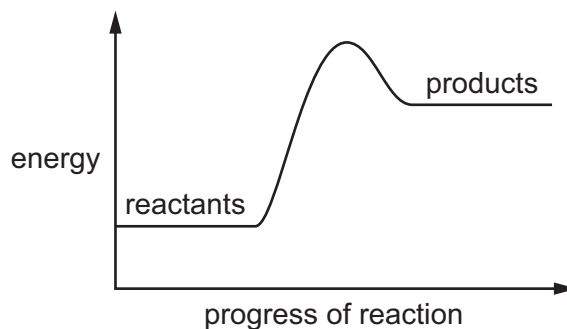
What is the ionic equation for this reaction?

- A $\text{Pb}^+ + \text{I}^- \rightarrow \text{PbI}$
- B $\text{Pb}^{2+} + 2\text{I}^- \rightarrow \text{PbI}_2$
- C $\text{Pb}(\text{NO}_3)_2 + \text{I}^- \rightarrow \text{PbI} + 2\text{NO}_3^-$
- D $\text{Pb}^{2+} + 2\text{NO}_3^- + 2\text{I}^- \rightarrow \text{PbI}_2 + 2\text{NO}_3^-$

18 Which statement about the electrolysis of ionic substances is correct?

- A Negatively charged ions move to the cathode.
- B At the anode, ions lose electrons.
- C The anions gain electrons during electrolysis.
- D The cations are negatively charged.

19 The energy level diagram for dissolving solid ammonium nitrate in water is shown.



Which statement about this process is correct?

- A Activation energy is given out causing an overall increase in temperature.
- B Energy is taken in to form new bonds at the start of the reaction.
- C During the reaction, the temperature of the water decreases because the reaction takes in energy.
- D The products have a higher energy than the reactants because the reaction is exothermic.

20 Reducing agents are1..... in a reaction.

Reducing agents cause the other substance in the reaction to2..... oxygen.

Which words complete gaps 1 and 2?

	1	2
A	oxidised	gain
B	oxidised	lose
C	reduced	gain
D	reduced	lose

21 Dilute sulfuric acid reacts with aqueous potassium hydroxide.

What are the products of this reaction?

	potassium hydroxide	potassium sulfate	carbon dioxide	water
A	✓	x	✓	✓
B	x	✓	x	✓
C	x	✓	✓	✓
D	x	✓	x	x

key

✓ = yes

x = no

22 The results of two tests on solid P are shown.

	test	result
1	add aqueous sodium hydroxide to solid	gas given off that turns moist red litmus paper blue
2	dissolve solid in water, add dilute aqueous silver nitrate	white precipitate formed

What is P?

- A** aluminium carbonate
- B** aluminium sulfate
- C** ammonium chloride
- D** ammonium nitrate

23 Which electronic structure is that of a metal?

- A** 2,8,3
- B** 2,8,4
- C** 2,8,6
- D** 2,8,7

24 Why are gold alloys, rather than pure gold, used to make jewellery?

- A** Alloys are better electrical conductors.
- B** Alloys are less likely to corrode.
- C** Alloys are harder.
- D** Alloys are less dense.

25 What is an effect of increasing the amount of carbon dioxide in the atmosphere?

- A** increased acid rain
- B** increased climate change
- C** increased damage to buildings
- D** increased health problems

26 Which statements about the members of an homologous series are correct?

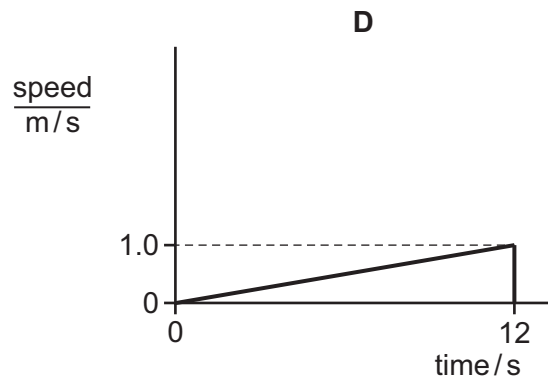
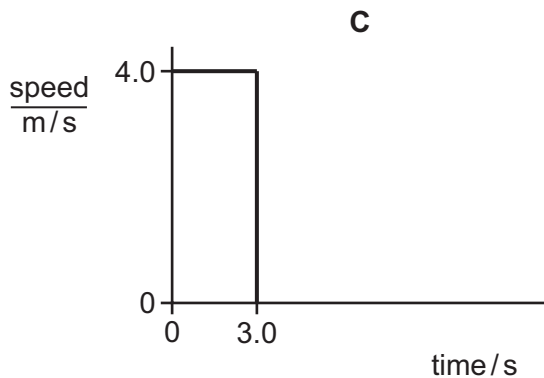
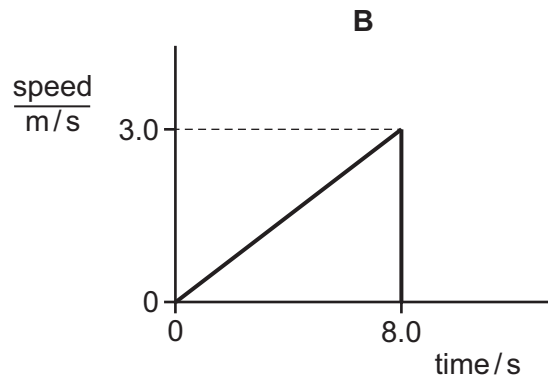
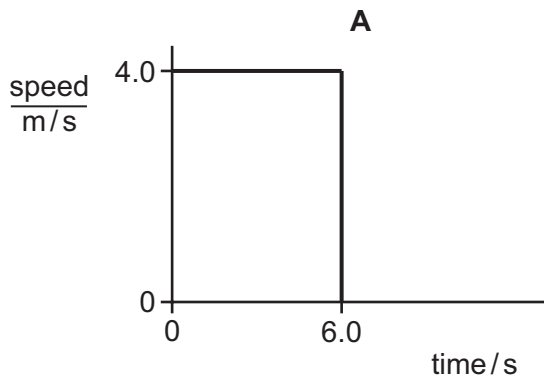
- 1 They have similar chemical properties.
- 2 They have the same boiling points.
- 3 They have the same general formula.

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

27 Which equation represents cracking?

- A** $\text{C}_6\text{H}_{14} \rightarrow 2\text{C}_3\text{H}_6 + \text{H}_2$
- B** $\text{C}_3\text{H}_8 + 5\text{O}_2 \rightarrow 3\text{CO}_2 + 4\text{H}_2\text{O}$
- C** $n\text{CH}_2=\text{CH}_2 \rightarrow \text{poly(ethene)}$
- D** $\text{CH}_2=\text{CH}_2 + \text{Br}_2 \rightarrow \text{CH}_2\text{BrCH}_2\text{Br}$

28 Which speed–time graph represents the motion of an object that travels a distance of 24 m?



29 A vehicle is taken from the Earth to the Moon where the gravitational field strength is smaller.

How do the mass and the weight of the vehicle on the Moon compare with their values on the Earth?

- A** smaller mass and smaller weight
- B** smaller mass and the same weight
- C** the same mass and smaller weight
- D** the same mass and the same weight

30 Which form of energy is **not** a form of potential energy?

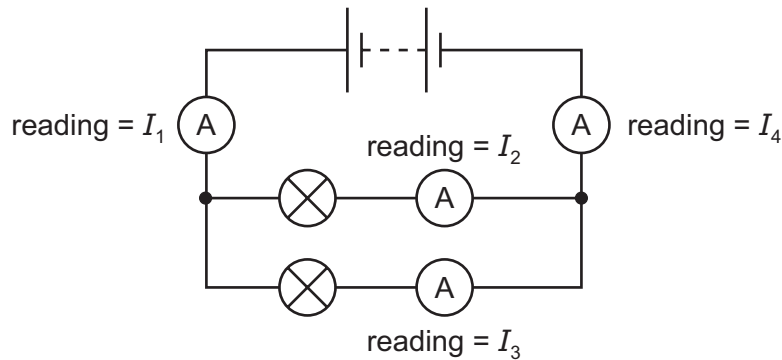
- A** chemical
- B** elastic
- C** gravitational
- D** sound

31 A rock of mass 2000 kg has a kinetic energy of 64 000 J.

What is the speed of the rock?

- A** 5.7 m/s
- B** 8.0 m/s
- C** 32 m/s
- D** 64 m/s

- 32 A circuit contains two lamps and four ammeters. The readings on the ammeters are I_1 , I_2 , I_3 and I_4 , as shown.



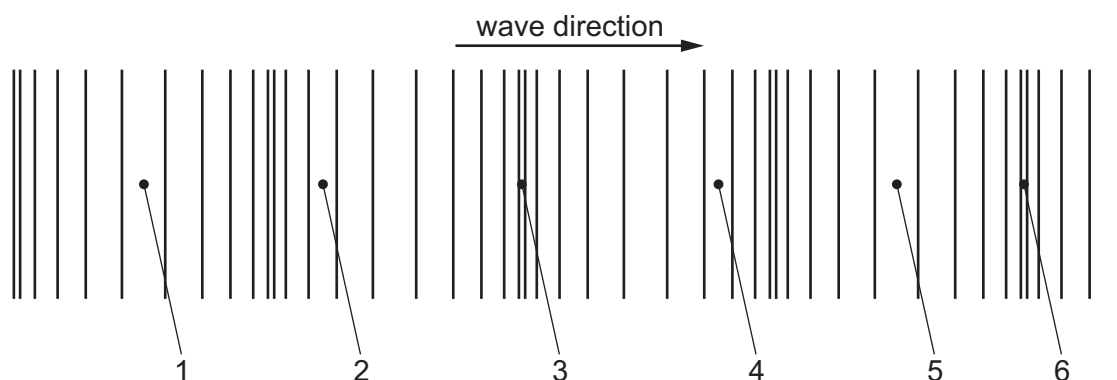
Which equation is correct?

- A** $I_1 = I_4 = (I_2 + I_3)$
- B** $(I_1 + I_4) = (I_2 + I_3)$
- C** $I_1 = I_2 = I_3 = I_4$
- D** $I_2 = I_3 = (I_1 + I_4)$
- 33 What happens as a liquid starts to evaporate?
- A** The mass of the remaining liquid increases.
- B** The mass of the remaining liquid is constant.
- C** The temperature of the remaining liquid decreases.
- D** The temperature of the remaining liquid increases.
- 34 The temperature of air next to a heater increases. This causes a convection current.

Which row describes what happens to the density of the air next to the heater and states the direction of movement of this air?

	density of air	direction of movement of air
A	decreases	downwards
B	decreases	upwards
C	increases	downwards
D	increases	upwards

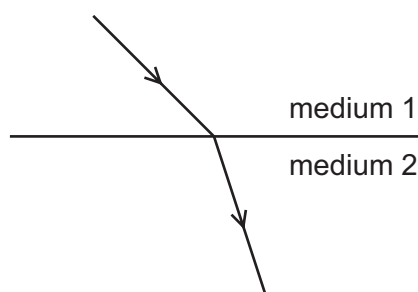
35 The diagram represents a sound wave travelling in air.



Which numbered points are at the centre of a compression and which numbered points are at the centre of a rarefaction?

	centre of a compression	centre of a rarefaction
A	1 and 5	2 and 4
B	1 and 5	3 and 6
C	3 and 6	1 and 5
D	3 and 6	2 and 4

36 The diagram shows the change in direction of light as it moves from medium 1 into medium 2.



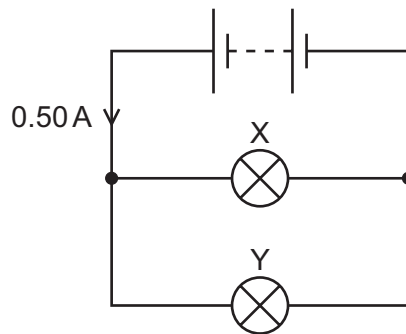
Why does this change of direction happen?

- A** Light is a longitudinal wave in medium 1 but a transverse wave in medium 2.
- B** Light is a transverse wave in medium 1 but a longitudinal wave in medium 2.
- C** The frequency of the light changes as it moves from medium 1 into medium 2.
- D** The speed of the light changes as it moves from medium 1 into medium 2.

- 37** A student uses a thin converging lens as a magnifying glass to view an object.

Where is the object placed?

- A** as far away as possible from the lens
 - B** at a distance from the lens that is slightly greater than the focal length of the lens
 - C** at a distance from the lens that is less than the focal length of the lens
 - D** between the lens and the student's eye
- 38** A battery is connected to two identical lamps X and Y in parallel.



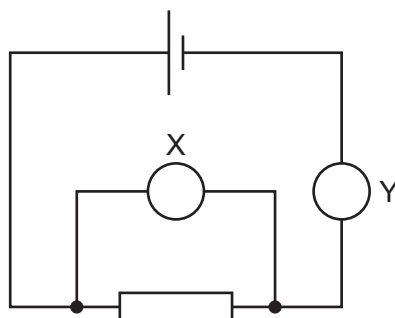
The current in the battery is 0.50 A.

How much charge flows through lamp Y in 10 s?

- A** 0.025 C
- B** 0.050 C
- C** 2.5 C
- D** 5.0 C

- 39 The diagram shows a cell connected to a resistor and two meters, X and Y.

The circuit is used when determining the resistance of the resistor.



What are the quantities measured by meters X and Y, and what are their correct units?

	meter X		meter Y	
	quantity	unit	quantity	unit
A	current	A	p.d.	V
B	current	V	p.d.	A
C	p.d.	A	current	V
D	p.d.	V	current	A

- 40 An electrical appliance with a resistance of $600\ \Omega$ is connected to a $240\ \text{V}$ supply.

Which fuse rating is appropriate to protect the appliance and the wires from overheating if a fault occurs?

- A** 0.04 A **B** 0.5 A **C** 5 A **D** 13 A

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The Periodic Table of Elements

Group																																	
I	II											III	IV	V	VI	VII	VIII																
1 H hydrogen 1 atomic number atomic symbol name relative atomic mass																																	
3	Li	4	Be														5	6	7	8	9	10											
lithium		beryllium															boron	carbon	nitrogen	oxygen	fluorine	neon											
7		9															11	12	14	16	19	20											
11	Na	12	Mg														13	14	15	16	17	18											
sodium		magnesium															Al	Si	P	S	Cl	Ar											
23		24															27	28	31	32	35.5	40											
19	K	20	Ca														31	32	33	34	35	36											
potassium		calcium															Ga	Ge	As	Se	Br	Kr											
39		40															70	73	75	79	80	84											
37	Rb	38	Sr														49	50	51	52	53	54											
rubidium		strontium															In	Sn	Sb	Te	I	Xe											
85		88															indium	tin	antimony	tellurium	iodine	xenon											
55	Cs	56	Ba														115	119	122	128	127	131											
		57–71															81	82	83	84	85	86											
		lanthanoids															Tl	Pb	Bi	Po	At	Rn											
133		barium															204	207	209	–	–	–											
87	Fr	88	Ra														113	114	115	116	117	118											
		actinoids															Nh	Fl	Mc	Lv	Ts	Og											
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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 dm³ at room temperature and pressure (r.t.p.).