



Cambridge IGCSE™

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/12

May/June 2024

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 What are the characteristics of living organisms?

	excretion	growth	movement	nutrition	reproduction	respiration	sensitivity
A	x	✓	✓	✓	✓	✓	x
B	✓	x	x	✓	x	✓	✓
C	✓	✓	x	✓	✓	✓	✓
D	✓	✓	✓	✓	✓	✓	✓

2 Which row is correct for osmosis?

	requires a partially permeable membrane	involves the movement of water
A	no	no
B	no	yes
C	yes	no
D	yes	yes

3 Which name is given to proteins that function as biological catalysts?

- A** enzymes
- B** hormones
- C** solvents
- D** vitamins

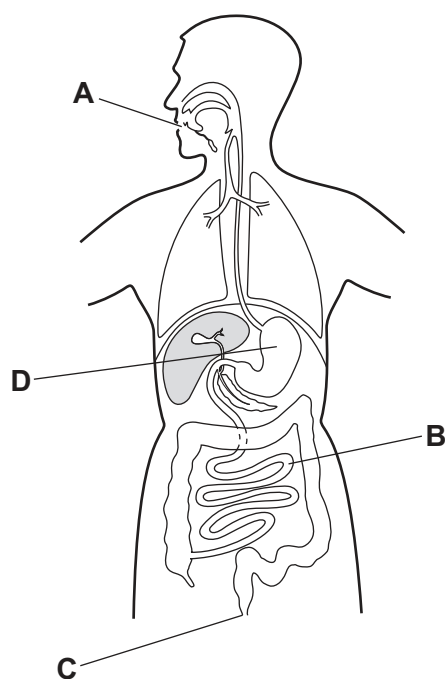
4 Which substance found in plant cells is needed for photosynthesis?

- A** chlorophyll
- B** glucose
- C** haemoglobin
- D** starch

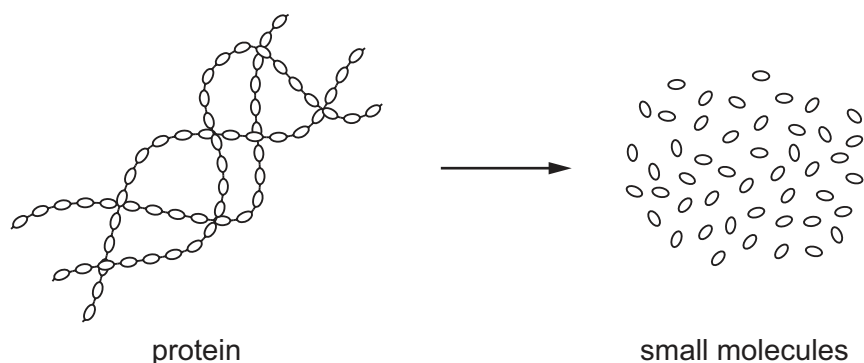
5 Which nutrient is needed for each function in the human body?

	to make red blood cells	for strong bones	for growth
A	calcium	iron	protein
B	calcium	protein	iron
C	iron	calcium	protein
D	iron	protein	calcium

6 Which region of the alimentary canal carries out ingestion?



- 7 The diagram shows what happens to proteins in the alimentary canal.



X is the type of digestion involved.

Y is a property of the small molecules produced.

Z is the name of the small molecules produced.

Which row represents X, Y and Z?

	X	Y	Z
A	chemical digestion	insoluble	fatty acids
B	chemical digestion	soluble	amino acids
C	mechanical digestion	insoluble	amino acids
D	mechanical digestion	soluble	fatty acids

- 8 Which environmental conditions result in the highest rate of transpiration from a plant?

	humidity	temperature
A	high	high
B	low	high
C	high	low
D	low	low

- 9 A student competes in a running race at school.

What is the effect on the student's rate and depth of breathing during the race?

	rate of breathing	depth of breathing
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 10 A cat suddenly jumps in front of a person walking down a street. The person is shocked.

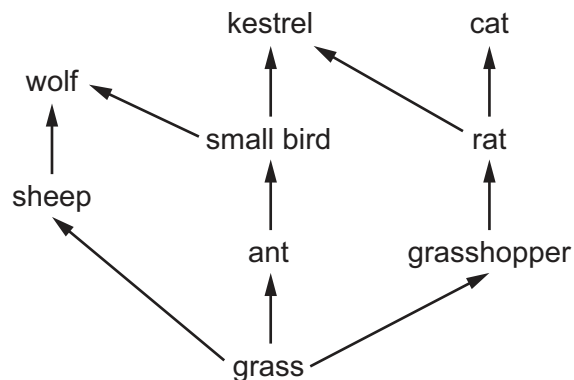
Which row shows the changes that occur?

	adrenaline level	pulse rate
A	unchanged	decreases
B	unchanged	increases
C	increases	decreases
D	increases	increases

- 11 Which statement about offspring produced by asexual reproduction is correct?

- A** The offspring are genetically different from one another.
- B** The offspring are genetically identical to their parent.
- C** The offspring are produced by two parents.
- D** The offspring are produced by the fusion of gametes.

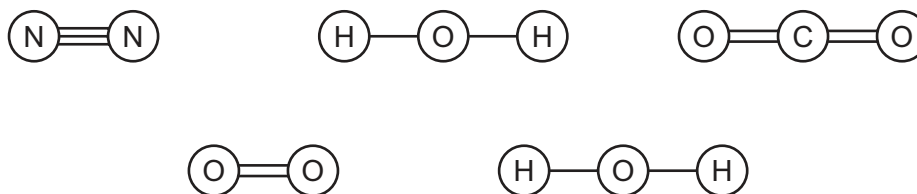
- 12 The diagram represents several food chains in a food web.



How many different food chains are there in the food web shown?

- A** 3
 - B** 4
 - C** 5
 - D** 9
- 13 What is an undesirable effect of deforestation?
- A** less carbon dioxide in the atmosphere
 - B** less extinction
 - C** less flooding
 - D** loss of soil

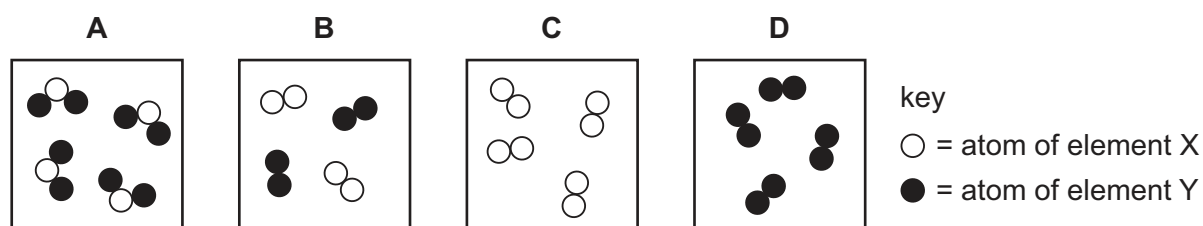
14 The diagram shows representations of some substances.



Which row identifies the total number of atoms and the total number of molecules in this diagram?

	number of atoms	number of molecules
A	4	5
B	10	4
C	13	4
D	13	5

15 Which diagram represents a mixture of elements?



16 Sodium chloride is an ionic compound made by reacting sodium with chlorine.

Which statement about the formation of sodium chloride is correct?

- A** Sodium atoms and chlorine atoms share pairs of electrons.
- B** Sodium atoms gain 1 electron.
- C** Chlorine atoms lose 1 electron.
- D** Sodium atoms lose 1 electron.

17 What is the formula of nitric acid?

- A** HCl
- B** HNO₃
- C** NaOH
- D** NH₃

18 Which row identifies the electrode products in the electrolysis of the named electrolyte?

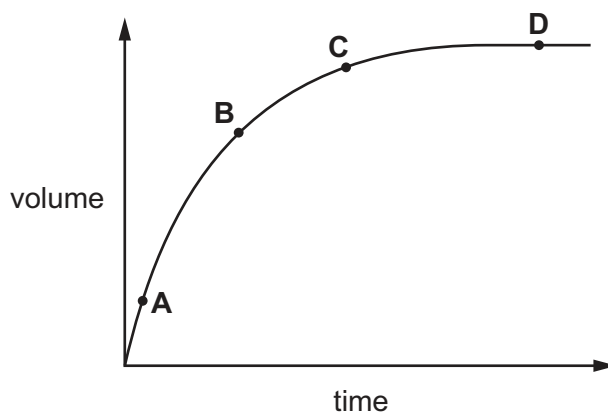
	electrolyte	product at anode	product at cathode
A	concentrated aqueous sodium chloride	chlorine	sodium
B	dilute sulfuric acid	hydrogen	oxygen
C	dilute sulfuric acid	sulfur dioxide	hydrogen
D	molten lead(II) bromide	bromine	lead

19 Which row describes an exothermic reaction?

	temperature of the reaction mixture	direction of energy transfer
A	decreases	from the surroundings
B	decreases	to the surroundings
C	increases	from the surroundings
D	increases	to the surroundings

20 The graph shows the volume of hydrogen gas produced when dilute hydrochloric acid reacts with zinc.

At which point is the rate of reaction greatest?



21 What is a reduction process?

- A** the combustion of a fuel
- B** the thermal decomposition of calcium carbonate
- C** the extraction of copper from copper oxide
- D** the reaction between an acid and an alkali

- 22** Compound X reacts with dilute nitric acid to give a colourless gas which turns limewater milky.
- An aqueous solution of X reacts with aqueous sodium hydroxide to form a light blue precipitate.

What is X?

- A** copper(II) carbonate
B copper(II) chloride
C iron(II) carbonate
D iron(II) chloride

- 23** Part of the Periodic Table is shown.

[illegible]

Which numbers represent a metal and a non-metal in the same period?

- A** 1 and 2 **B** 2 and 3 **C** 4 and 6 **D** 5 and 6

- 24** Which row describes elements in Group I and Group VII of the Periodic Table?

	Group I elements	Group VII elements
A	are solid at room temperature	are solid, liquid or gas at room temperature
B	are poor conductors of heat and electricity	are good conductors of heat and electricity
C	consist of negatively charged ions	consist of diatomic molecules
D	gain electrons when they react with Group VII elements	lose electrons when they react with Group I elements

- 25** Which statement describes an alloy?

- A** It is a compound containing a metal and a non-metal.
- B** It is a compound containing two metals.
- C** It is a mixture of a metal with other elements.
- D** It is a pure metal.

26 Which statements about water are correct?

- 1 In a water molecule, the oxygen atom has eight electrons in its outer shell.
- 2 Water changes the colour of cobalt(II) chloride to blue.
- 3 In water treatment, water is filtered to remove dissolved impurities.
- 4 In water treatment, chlorine is added to kill bacteria.

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

27 Butane is a hydrocarbon.

What are the products of the complete combustion of butane?

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

28 A student determines the volume of a laboratory notebook.

Which measuring instruments are used?

- A** a clock and a measuring cylinder
B a measuring cylinder and a ruler
C a measuring cylinder only
D a ruler only

29 A student wants to find the period of a pendulum. He determines the time taken for the pendulum to make one complete oscillation. He repeats the measurement several times.

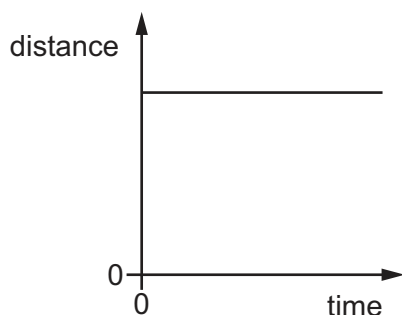
His results are shown in the table.

measurement	1	2	3	4	5	6
time taken / s	1.6	1.4	1.4	1.5	1.4	1.7

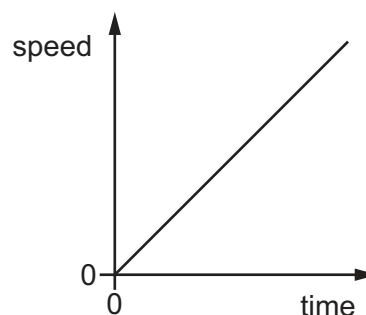
What is the average value for the period of the pendulum?

A 1.4 s **B** 1.5 s **C** 1.7 s **D** 9.0 s

30 Graph 1 is a distance–time graph. Graph 2 is a speed–time graph.



graph 1

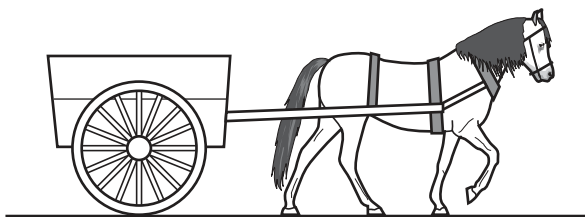


graph 2

Which graphs represent the motion of a car that is moving at constant speed?

- A both graph 1 and graph 2
- B graph 1 only
- C graph 2 only
- D neither graph 1 nor graph 2

31 A cart is pulled along a horizontal road by a horse.



The horse does work on the cart. The work done depends on the force exerted on the cart and on one other quantity.

What is the other quantity?

- A the distance between the horse and the cart
- B the distance moved by the cart
- C the height of the horse
- D the weight of the cart

32 As an electric car starts moving, the car motor transfers energy to the wheels.

Which process is involved in this transfer of energy?

- A work done by heating in the motor
- B work done by the frictional force between the wheels and the road
- C work done by the mechanical force from the motor
- D work done by a decrease in gravitational potential energy

33 Which energy resource is non-renewable?

- A** geothermal
- B** hydroelectric
- C** nuclear
- D** wind

34 Some of the liquid in a beaker starts to evaporate.

What happens to the temperature of the liquid remaining and why does the temperature change?

- A** The temperature decreases because more-energetic molecules escape.
- B** The temperature decreases because there are fewer molecules remaining.
- C** The temperature increases because less-energetic molecules escape.
- D** The temperature increases because there are fewer molecules remaining.

35 A glass bottle is half full of water.

The glass bottle has a metal cap that fits tightly over the top of the bottle and is difficult to unscrew.

After the glass bottle and the metal cap are immersed in hot water, the cap unscrews easily.

Why is this?

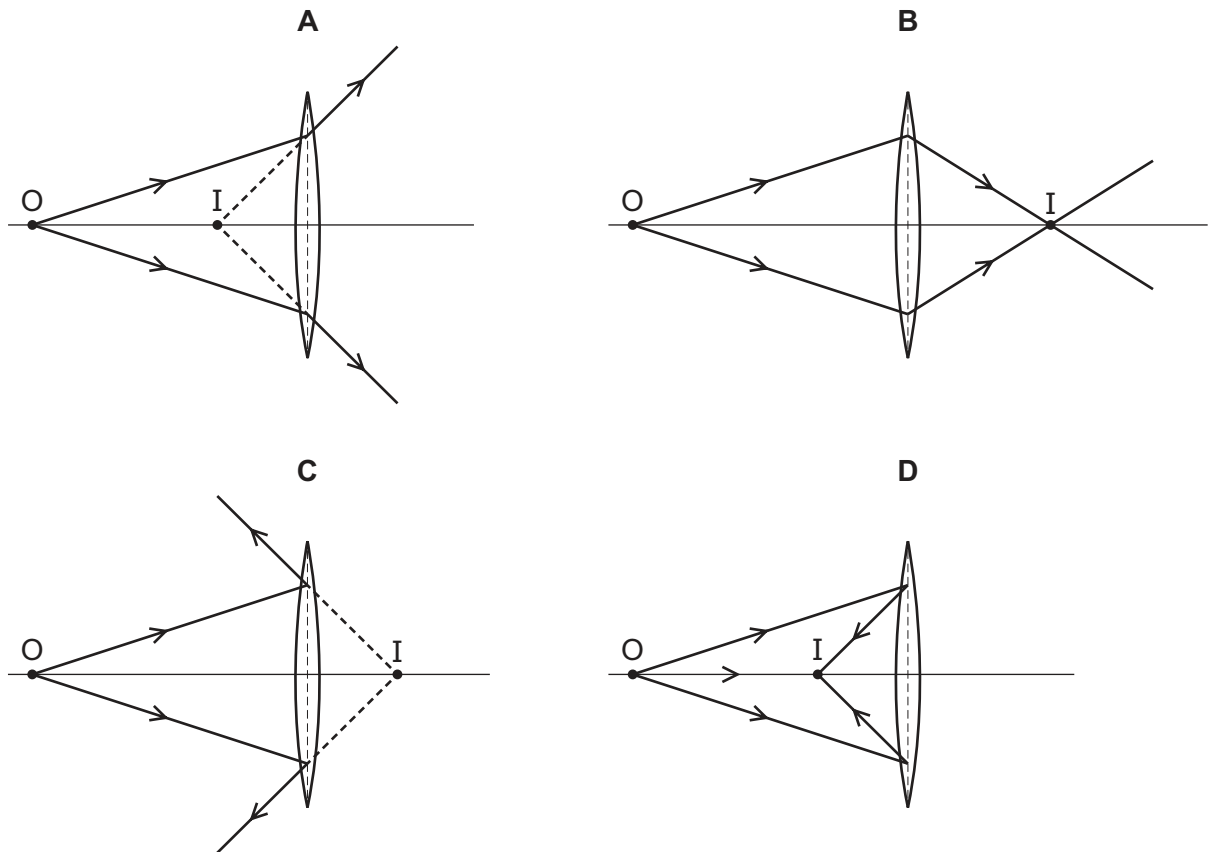
- A** The air inside the glass bottle expands.
- B** The glass bottle expands more than the metal cap.
- C** The metal cap expands more than the glass bottle.
- D** The water in the glass bottle expands.

36 Energy is transferred from the Sun through the vacuum of space to all the planets in the Solar System.

How is the energy transferred?

- A** by conduction, convection and radiation
- B** by conduction only
- C** by convection only
- D** by radiation only

- 37 Which diagram shows how a converging lens forms a real image of object O at the point labelled I?



- 38 Which row gives the unit for potential difference (p.d.) and the unit for electromotive force (e.m.f.)?

	p.d.	e.m.f.
A	J	N
B	J	V
C	V	N
D	V	V

- 39 Two heaters are connected in parallel to a socket that is protected by a fuse.

The current in each heater is 9.0 A.

What is a suitable rating for the fuse?

- A** 3 A **B** 5 A **C** 9 A **D** 20 A

40 Two lamps can be connected to a power supply either in series or in parallel.

Which statement is correct?

- A** In a series circuit, the current from the power supply is greater than the current in each lamp.
- B** Lamps connected in parallel can be controlled separately by using switches.
- C** The combined resistance of lamps in series is less than when they are connected in parallel.
- D** When one lamp in a series circuit stops working, the other lamp always remains lit.

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The Periodic Table of Elements

Group																				
I	II											III	IV	V	VI	VII	VIII			
		1 H hydrogen 1																		
		Key atomic number atomic symbol name relative atomic mass																		
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		
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	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 —	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 oganeson —			

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.).