



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

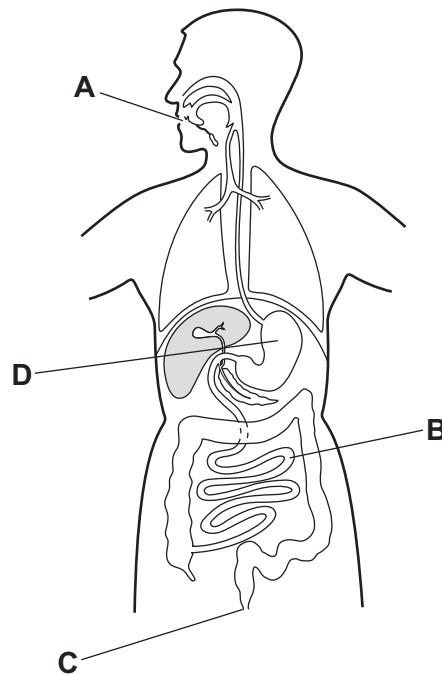
4 Which substance found in plant cells is needed for photosynthesis?

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

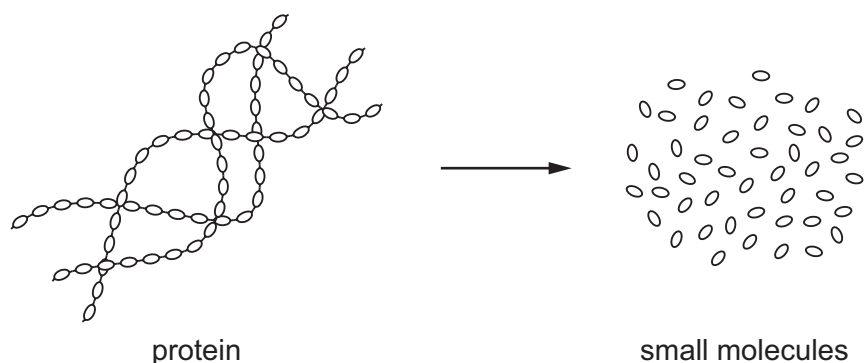
5 Which nutrient is needed for each function in the human body?

	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.

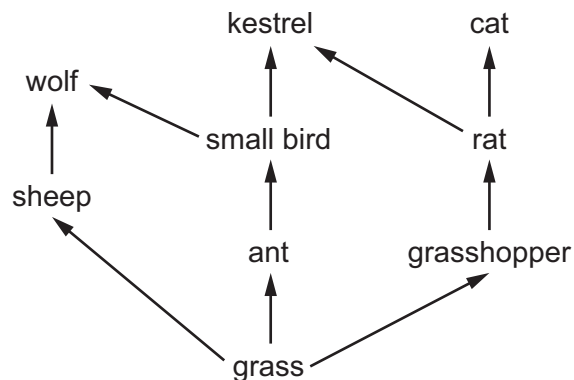
Which row shows the changes that occur?

	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.

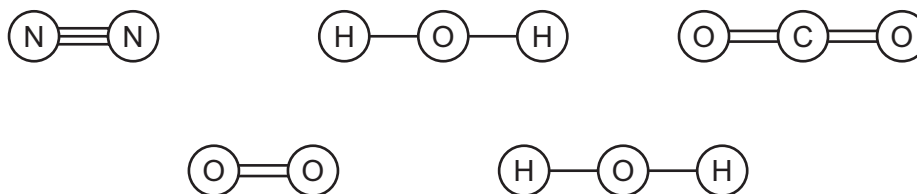
- 12** The diagram represents several food chains in a food web.



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

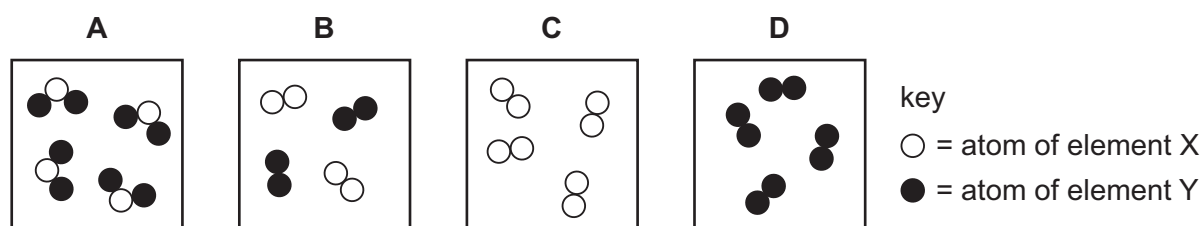
14 The diagram shows representations of some substances.



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** HNO_3
- C** NaOH
- D** NH_3

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

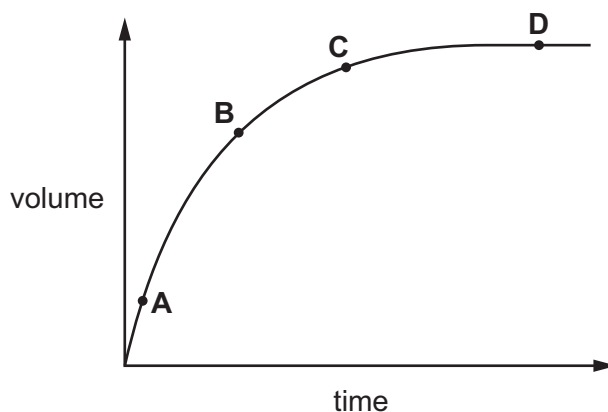
	electrolyte	product at anode	product at cathode
A	concentrated aqueous sodium chloride	chlorine	sodium
B	dilute sulfuric acid	hydrogen	oxygen
C	dilute sulfuric acid	sulfur dioxide	hydrogen
D	molten lead(II) bromide	bromine	lead

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

- ## What is X?

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

[illegible]

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

- | | 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 |

- 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.

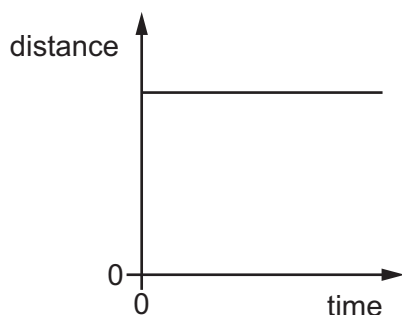
His results are shown in the table.

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

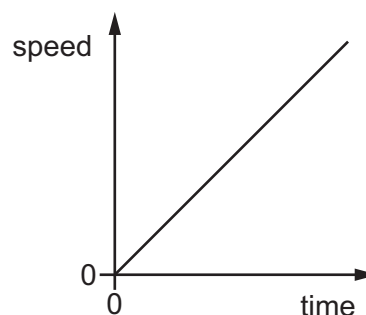
What is the average value for the period of the pendulum?

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.



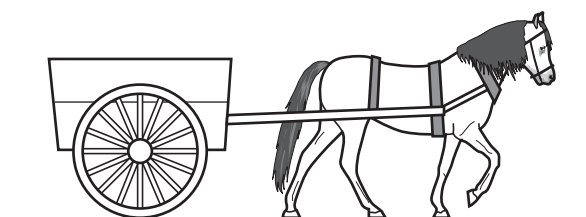
graph 1



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?

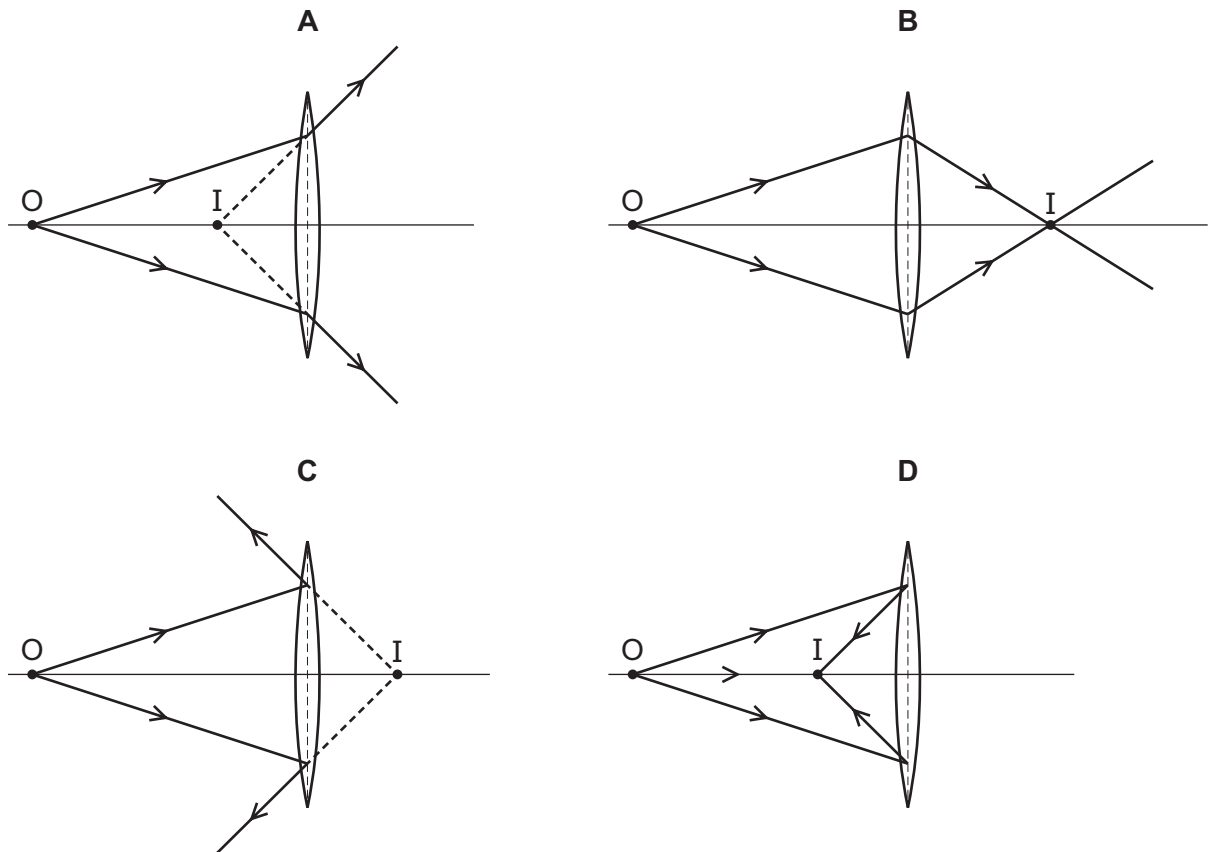
- A** The air inside the glass bottle expands.
- B** The glass bottle expands more than the metal cap.
- C** The metal cap expands more than the glass bottle.
- D** The water in the glass bottle expands.

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 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											
																	31	32	33	34	35	36											
19	K	20	Ca														Ga	Ge	As	Se	Br	Kr											
potassium		calcium															gallium	germanium	arsenic	selenium	bromine	krypton											
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											
																	115	119	122	128	127	131											
55	Cs	56	Ba														81	82	83	84	85	86											
caesium		barium															Tl	Pb	Bi	Po	At	Rn											
133		137															204	207	209	—	—	—											
87	Fr	88	Ra														113	114	115	116	117	118											
francium		radium															Nh	Fl	Mc	Lv	Ts	Og											
																	—	—	—	—	—	—	—										
																	—	—	—	—	—	—	—										

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.).