



Cambridge IGCSE™

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice (Core)

February/March 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.

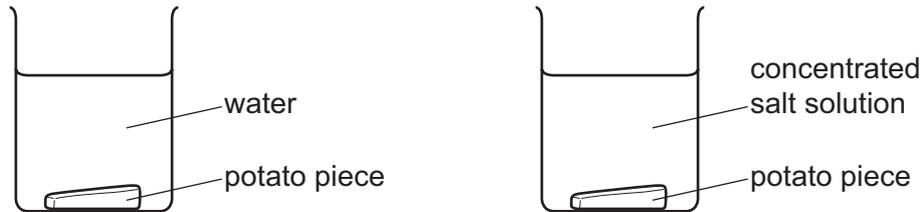
This document has **16** pages. Any blank pages are indicated.



1 Which characteristics help to define a living organism?

- A diffusion, movement, respiration
- B excretion, nutrition, sensitivity
- C excretion, reproduction, transpiration
- D growth, inspiration, nutrition

2 Two pieces of potato are cut to have exactly the same mass and shape. The mass is measured and recorded.



One piece of potato is placed in water and the other piece is placed in concentrated salt solution.

They are both left for one hour.

The mass of each piece of potato is then measured again.

What happens to the mass of each piece of potato?

	mass of potato placed in water	mass of potato placed in concentrated salt solution
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

3 The results of tests carried out on four food samples are shown.

sample	Benedict's test	iodine test	biuret test
1	✓	✓	✗
2	✓	✗	✓
3	✗	✓	✗
4	✗	✗	✓

key

✓ = positive result

✗ = negative result

Which two samples contain protein?

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

- 4 Which type of molecule is an enzyme?
- A carbohydrate
B fat
C protein
D vitamin
- 5 What is the word equation for photosynthesis?
- A carbon dioxide + water → glucose + oxygen
B glucose + oxygen → carbon dioxide + water
C oxygen + carbon dioxide → glucose + water
D water + oxygen → glucose + carbon dioxide
- 6 Which two nutrients are needed for healthy bone and tooth development?
- A calcium and iron
B fibre and vitamin C
C fibre and vitamin D
D vitamin D and calcium
- 7 Which statement about all arteries is correct?
- A They always contain oxygenated blood.
B They have many valves on their inner walls.
C They have a wide lumen.
D They transport blood away from the heart.
- 8 The table shows the differences in the composition of carbon dioxide, oxygen and water vapour for inspired and expired air.

Which row shows the most likely composition for human inspired and expired air?

	carbon dioxide %		oxygen %		water vapour %	
	inspired	expired	inspired	expired	inspired	expired
A	4	0.04	21	16	1	1
B	0.04	4	21	16	1	6
C	0.04	4	16	21	6	1
D	4	0.04	16	21	6	6

9 Which descriptions of food molecules before and after chemical digestion are correct?

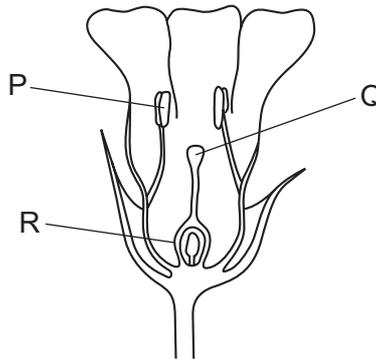
	food molecules before chemical digestion	food molecules after chemical digestion
A	large and insoluble	small and soluble
B	large and soluble	small and insoluble
C	small and insoluble	large and soluble
D	small and soluble	large and insoluble

10 In which situations does the secretion of adrenaline increase?

- 1 an athlete waiting for the starting signal at the beginning of a race
- 2 a mother zebra seeing a lion moving towards her offspring
- 3 a child about to fall asleep

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

11 The diagram shows a section through a flower.



Which row identifies the labelled parts of the flower?

	P	Q	R
A	anther	ovary	stigma
B	anther	stigma	ovary
C	stamen	carpel	sepal
D	stamen	sepal	carpel

12 The diagram shows a food chain.

oak tree → caterpillar → robin → hawk

Which term is correct for the hawk in this food chain?

- A primary consumer
- B producer
- C secondary consumer
- D tertiary consumer

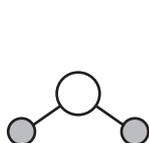
13 Some of the processes involved in the carbon cycle are listed.

- 1 combustion
- 2 decomposition
- 3 fossilisation
- 4 photosynthesis

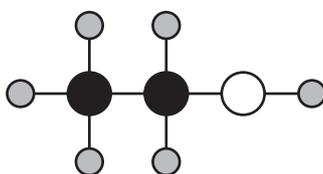
Which processes release carbon dioxide into the atmosphere?

- A 1, 2 and 3 B 1 and 2 only C 2, 3 and 4 D 3 and 4 only

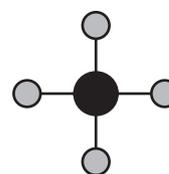
14 The structures of three molecules are shown.



water



ethanol



methane

How many atoms are in each molecule?

	water	ethanol	methane
A	2	3	2
B	2	4	5
C	3	3	2
D	3	9	5

15 Which symbol equation is balanced?

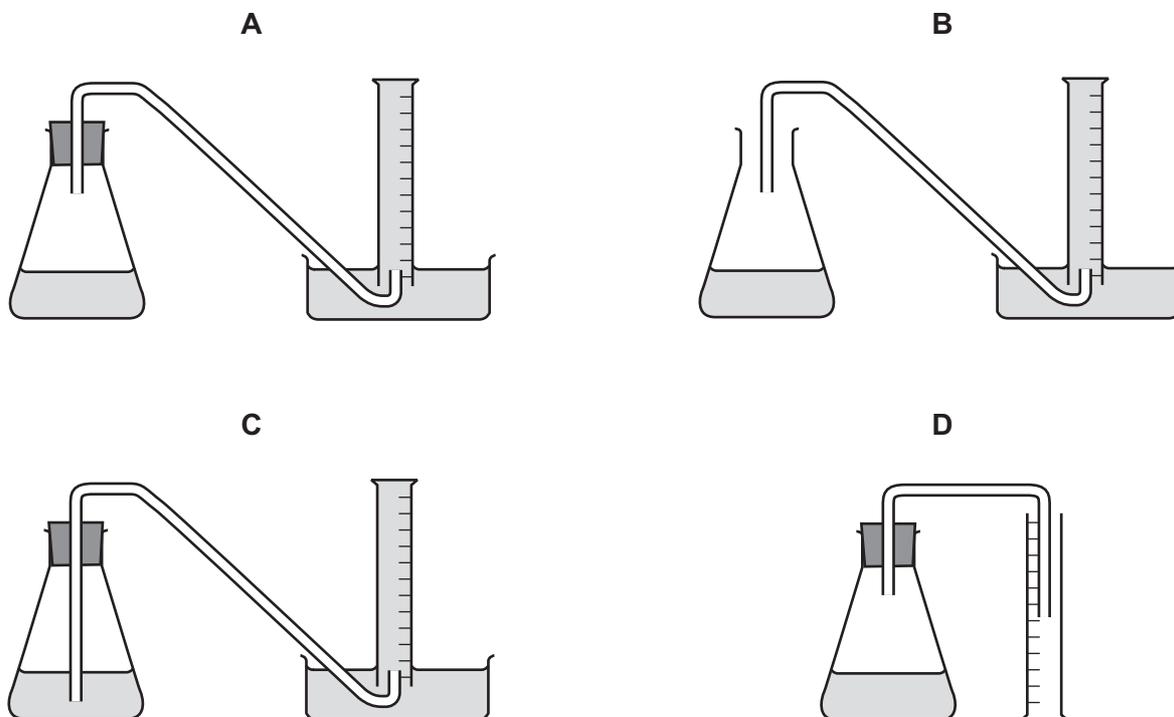
- A $\text{H}_2 + \text{Cl}_2 \rightarrow \text{HCl}$
 B $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
 C $\text{CH}_4 + \text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
 D $\text{Mg} + \text{O}_2 \rightarrow 2\text{MgO}$

16 A student measures the initial temperature and the final temperature in four different reactions.

Which row shows the results for the most endothermic reaction?

	initial temperature /°C	final temperature /°C
A	19	29
B	20	16
C	22	17
D	22	26

17 Which apparatus is used to determine the rate of reaction when magnesium reacts with dilute hydrochloric acid?



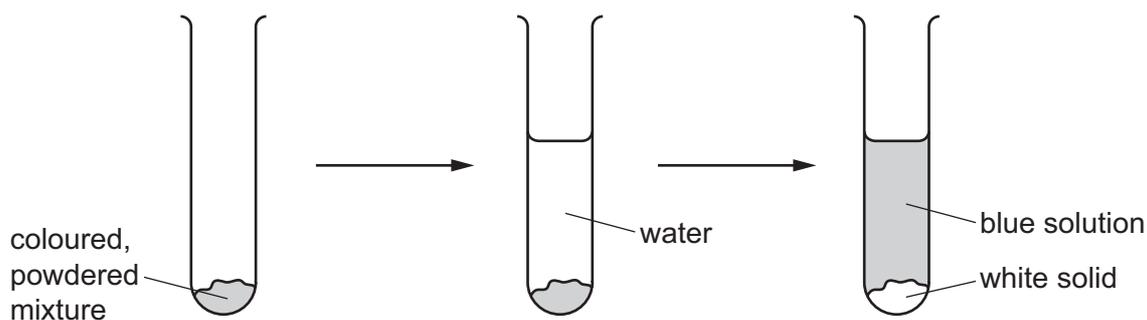
18 Which statement describes a redox reaction?

- A An acid reacts with a base.
- B Only oxidation takes place.
- C Oxygen is transferred from one substance to another.
- D Two substances are both reduced.

19 Which solid reacts with sulfuric acid to produce a gas?

- A copper
- B copper carbonate
- C copper oxide
- D copper sulfate

20 Some water is added to a coloured, powdered mixture. After shaking, a blue solution and a white solid are seen.



What does the powder contain?

- A sodium chloride and copper(II) oxide
 - B sodium chloride and copper(II) sulfate
 - C barium sulfate and copper(II) oxide
 - D barium sulfate and copper(II) sulfate
- 21 Which trend is shown by the elements across a complete period of the Periodic Table, from left to right?
- A metals → non-metals
 - B metals → non-metals → metals
 - C non-metals → metals
 - D non-metals → metals → non-metals

22 Which row describes a noble gas?

	type of particle	reactivity
A	diatomic	high
B	diatomic	low
C	monatomic	high
D	monatomic	low

23 Which statement about the extraction of metals is correct?

- A** Aluminium is extracted from aluminium oxide by heating with carbon.
- B** Aluminium is less reactive than copper so aluminium can be extracted by electrolysis.
- C** Carbon can be used to remove oxygen from copper(II) oxide.
- D** Copper is extracted from the ore bauxite.

24 Which colour change is seen when water is added to anhydrous cobalt(II) chloride?

- A** white to blue
- B** pink to blue
- C** blue to white
- D** blue to pink

25 Which statements about air pollutants are correct?

- 1 Sulfur dioxide can damage buildings.
- 2 Oxides of nitrogen are harmful to health.
- 3 Carbon monoxide is a poisonous gas.
- 4 Carbon monoxide can damage buildings.

- A** 1, 2 and 3 **B** 1 and 2 only **C** 2, 3 and 4 **D** 3 and 4 only

26 Ethane is a hydrocarbon.

What are the products of the complete combustion of ethane?

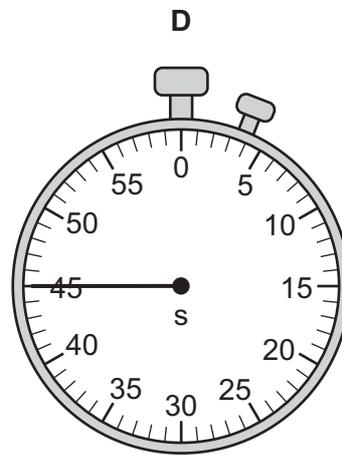
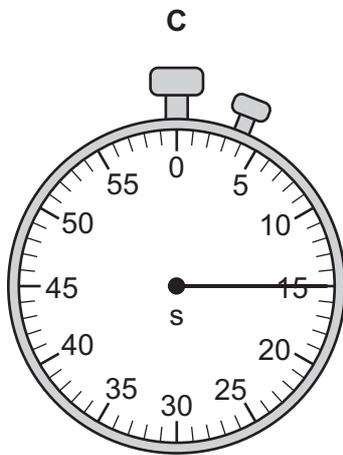
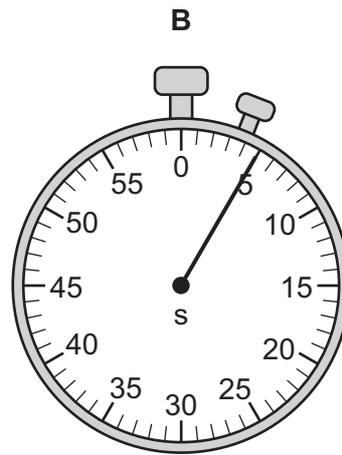
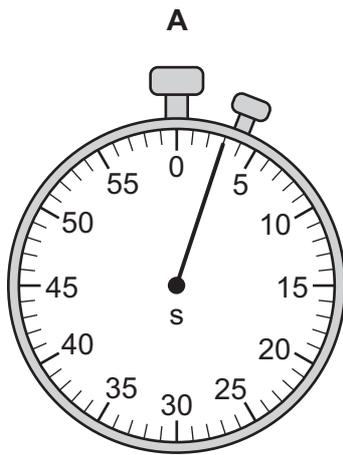
- A** carbon dioxide and hydrogen
- B** carbon dioxide and water
- C** carbon monoxide and hydrogen
- D** carbon monoxide and water

27 What is produced by cracking?

- A alkenes
- B fractions
- C naphtha
- D polymers

28 The period of a pendulum is 3.0 s.

Which stop-watch shows the time for 15 periods of the pendulum?



29 A feather is falling through the air. Air resistance acts on the feather.

In which unit is air resistance measured?

- A Ω
- B kg
- C m/s
- D N

30 A solid object floats on a liquid if its density is less than that of the liquid.

A solid object has a mass of 350 g and a volume of 500 cm³.

The densities of three liquids are shown.

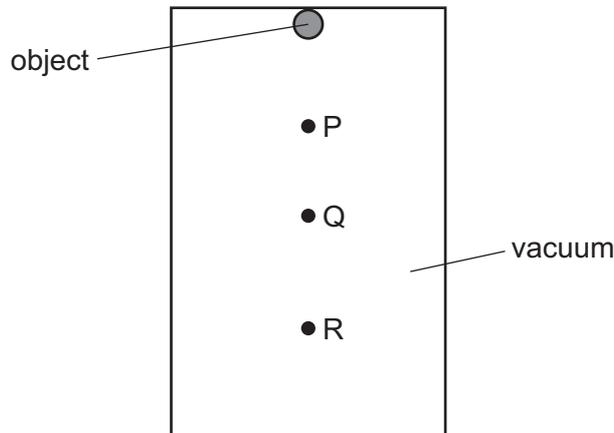
liquid	$\frac{\text{density}}{\text{g/cm}^3}$
diesel	0.86
ethanol	0.79
petrol (gasoline)	0.68

On which liquids does the solid object float?

- A** diesel and ethanol only
 - B** diesel and petrol only
 - C** ethanol and petrol only
 - D** diesel, ethanol and petrol
- 31** Which object has a resultant force acting on it?
- A** a book at rest on a table
 - B** a car travelling up a hill in a straight line at constant speed
 - C** a football moving upwards freely after being kicked
 - D** a parachutist descending vertically at constant speed

32 An object is falling in a vacuum.

As the object falls, it passes through points P, Q and R.



Which statement describes the total quantity of energy of the object as it falls?

- A It is greatest at point P.
 - B It is greatest at point Q.
 - C It is greatest at point R.
 - D It is the same at points P, Q and R.
- 33 Which statement explains why wind energy is called a renewable source of energy?
- A It is continuously replaced from natural sources.
 - B It does not cause pollution.
 - C It is only available at certain times.
 - D It provides a large quantity of energy.
- 34 A girl holds a thick glass beaker and pours hot water into it.

There is a noticeable delay before she feels the thermal energy from the water reaching her hand.

Which statement explains this delay?

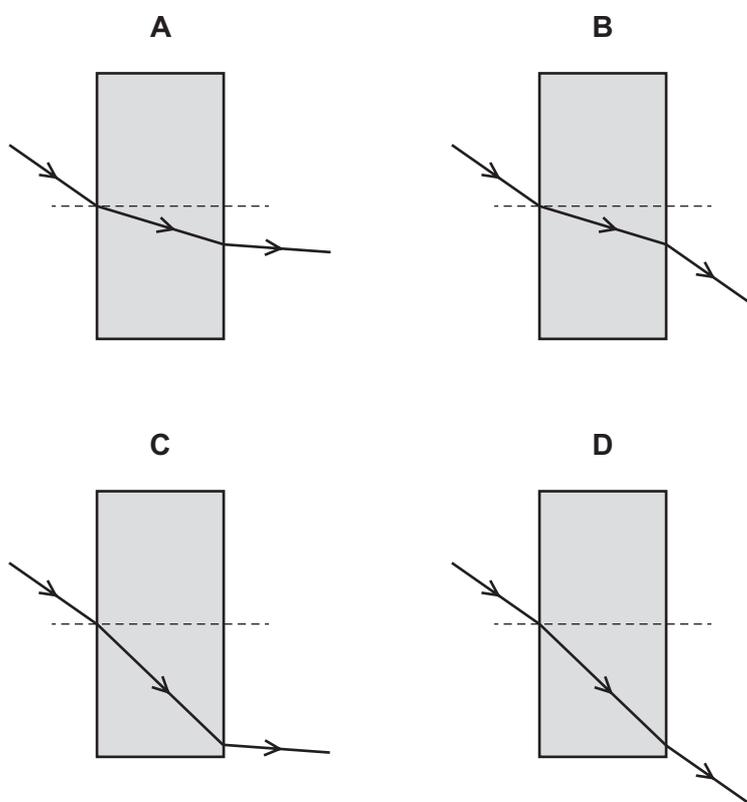
- A Glass is a bad thermal conductor.
- B Glass is a good thermal conductor.
- C Water is a bad thermal conductor.
- D Water is a good thermal conductor.

35 In which states of matter can convection occur?

	in a solid	in a liquid	in a gas
A	no	no	yes
B	no	yes	yes
C	yes	no	no
D	yes	yes	no

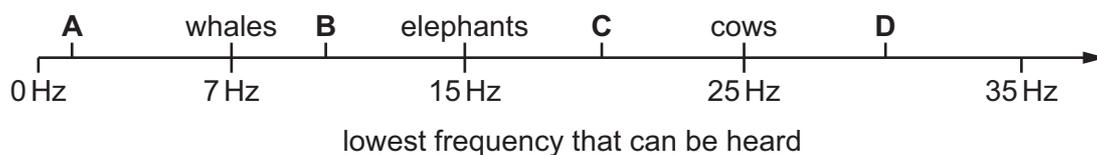
36 A ray of light in air is incident on a glass block. The ray of light is refracted as it enters the glass block and as it emerges from the glass block.

Which diagram shows the complete path of the light ray?



37 The diagram shows the order of the lowest frequency of sound that can be heard by some animals.

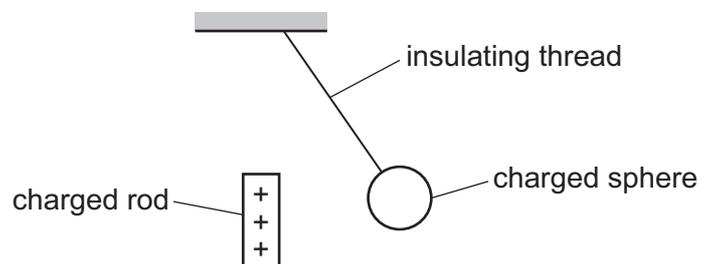
Which labelled position shows the lowest frequency that can be heard by humans with healthy ears?



38 A charged sphere is suspended by an insulating thread.

A positively charged rod is moved close to the sphere.

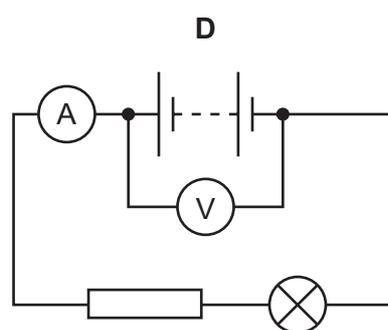
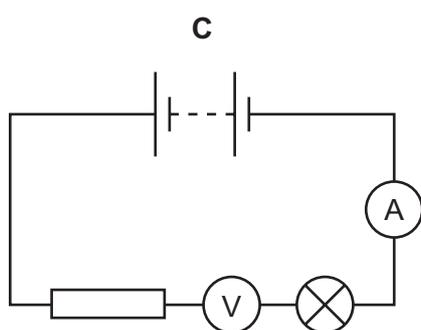
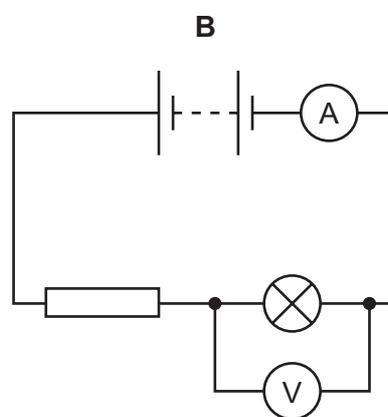
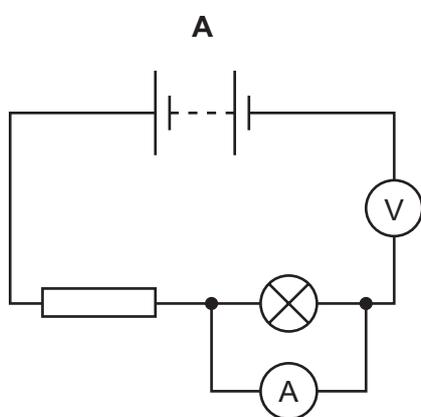
The sphere is deflected as shown.



What is the charge on the sphere and why is the sphere deflected?

	charge on the sphere	reason for deflection
A	negative	like charges repel
B	negative	unlike charges repel
C	positive	like charges repel
D	positive	unlike charges repel

39 Which circuit is used to measure the current in a lamp and the potential difference (p.d.) across the lamp?



- 40 When a computer is switched on, the current increases quickly to 3.1 A and then decreases slowly to a steady value of 1.0 A when the computer is in use.

The cable connecting the computer to the power supply can safely carry a current of 10.0 A.

The circuit contains a fuse.

Which fuse rating is used to provide suitable protection?

- A** 1 A **B** 3 A **C** 5 A **D** 13 A

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