Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/11**

Paper 1 Multiple Choice **May/June 2024**

1 hour

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 statement describes why carbon dioxide diffuses from the blood into the alveoli?

A The carbon dioxide concentration in the alveoli is greater than the oxygen concentration in the blood.

B The carbon dioxide concentration in the alveoli is greater than the concentration of carbon dioxide in the blood.

C The carbon dioxide concentration in the blood is greater than the concentration of carbon dioxide in the alveoli.

D The carbon dioxide concentration in the blood is greater than the oxygen concentration in the alveoli.

2 Which chemical test reagent would identify the substance from which enzymes are formed?

A Benedict's solution

B biuret reagent

C ethanol

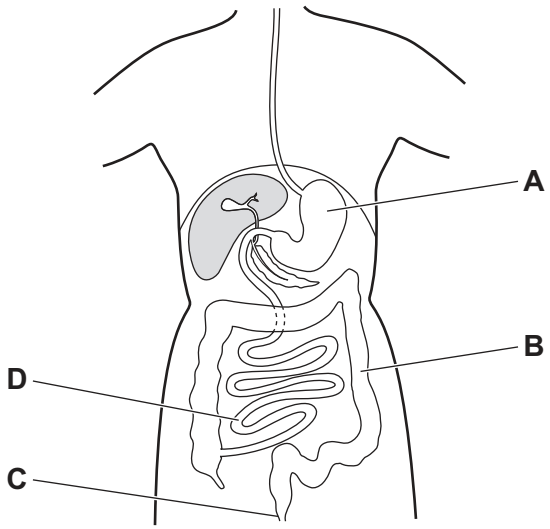
D iodine solution

3 Which raw materials are necessary for photosynthesis?

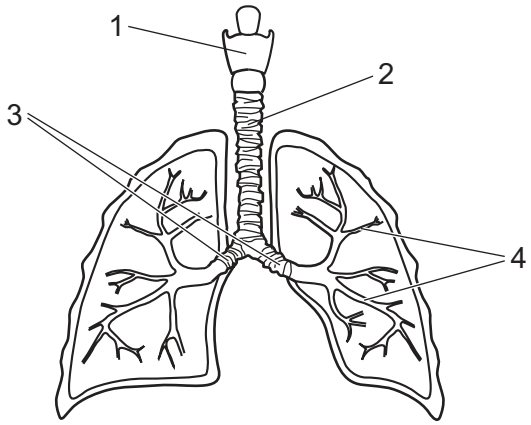
	carbon dioxide	oxygen	water
A	yes	yes	yes
B	yes	yes	no
C	yes	no	yes
D	no	yes	yes

4 The diagram shows some of the organs of the human digestive system.

Which labelled organ is the colon?



5 The diagram shows the human lungs.



Which row correctly identifies structures 1, 2, 3 and 4?

	1	2	3	4
A	trachea	larynx	bronchi	bronchioles
B	larynx	bronchioles	bronchi	trachea
C	larynx	trachea	bronchi	bronchioles
D	bronchi	trachea	larynx	bronchioles

6 Which organ breaks down lactic acid?

A kidney

B liver

C pancreas

D stomach

7 Which statement describes a vein?

A It has thick walls, no valves and carries blood away from the heart.

B It has thick walls, valves and carries blood under high pressure.

C It has thin walls, no valves and carries blood under high pressure.

D It has thin walls, valves and carries blood back to the heart.

8 What is a substance which modifies or affects chemical reactions in the body?

A drug

B glycerol

C platelet

D urea

9 Where is the central nervous system (CNS) located?

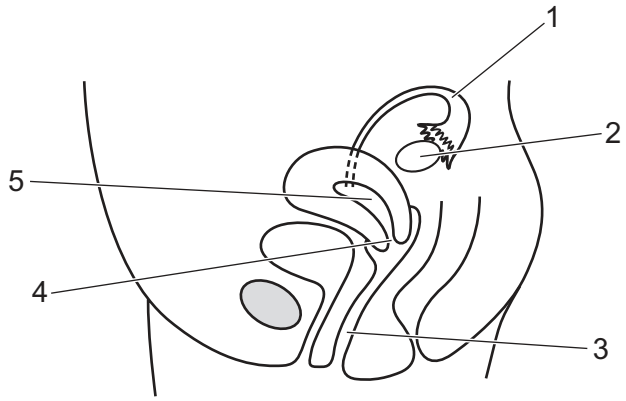
A brain and heart

B brain and spinal cord

C feet and heart

D feet and spinal cord

10 The diagram shows a section through the human female reproductive system.



Which structures are the normal site of fertilisation and the site of gamete formation?

	normal site of fertilisation	site of gamete formation
A	1	2
B	2	3
C	3	4
D	4	5

11 Bacteria are used in biotechnology.

What are the reasons for this?

1 There are many different types of bacteria.

2 They are very large in size.

3 They can make complex molecules.

4 They reproduce rapidly.

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

12 Why is the release of plastic waste into the environment a problem?

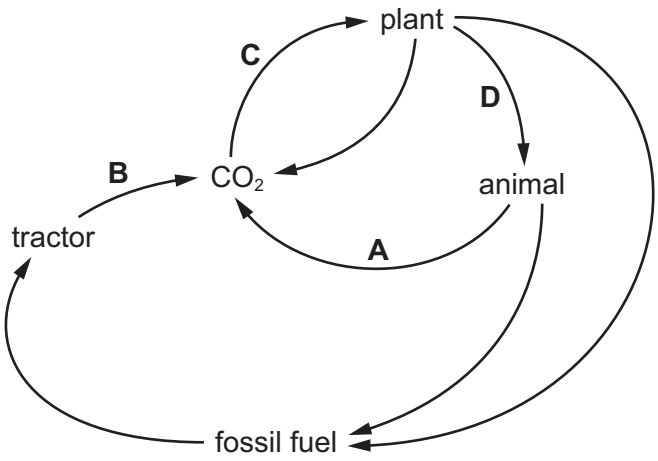
1 All plastic waste is biodegradable.

2 Plastic waste can be eaten by animals.

3 Some plastic waste can release toxins.

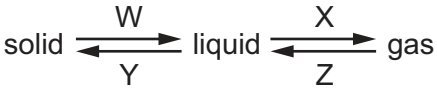
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

13 Which process in the carbon cycle may indicate the activity of decomposers?



14 The element bromine has a melting point of –7 °C and a boiling point of 59 °C.

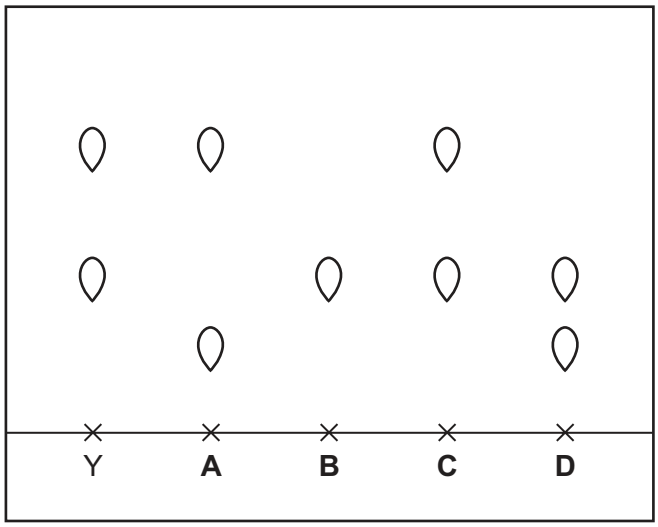
During which changes of state of bromine do the particles move closer together?



A W and X **B** X and Y **C** Y and Z **D** W and Z

15 The chromatogram shows an unknown substance Y compared to four known substances.

What is Y?



16 Which statement about an atom is always correct?

A The number of protons is the same as the number of neutrons.

B The number of protons is the same as the number of electrons.

C The number of protons is more than the number of electrons.

D The number of protons is less than the number of neutrons.

17 Which dot-and-cross diagram represents the outer electrons in a nitrogen molecule?

A

B

C

D

18 Dilute sulfuric acid reacts with aqueous sodium carbonate to make aqueous sodium sulfate, carbon dioxide and water.

Which row shows the state symbols for the reactants and the products?

	dilute sulfuric acid	aqueous sodium carbonate	aqueous sodium sulfate	carbon dioxide	water
A	(aq)	(aq)	(aq)	(g)	(aq)
B	(aq)	(aq)	(aq)	(g)	(l)
C	(l)	(aq)	(aq)	(g)	(aq)
D	(l)	(aq)	(aq)	(g)	(l)

19 The equation for the decomposition of calcium carbonate is shown.

$$CaCO_3 \rightarrow CaO + CO_2$$

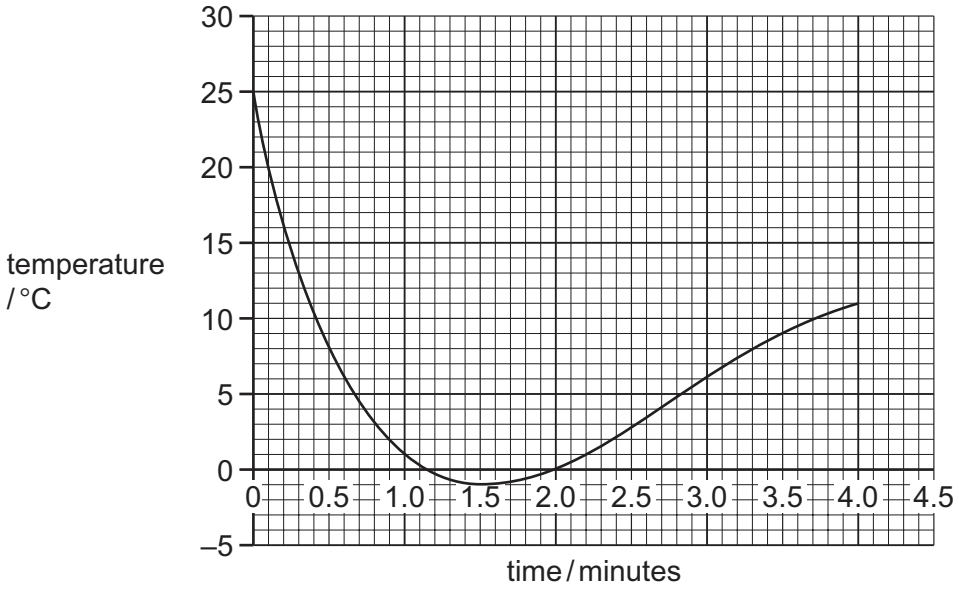
Which mass of calcium oxide is produced from 10.0 g of calcium carbonate?

A 4.4 g **B** 5.0 g **C** 5.6 g **D** 10.0 g

20 Solid citric acid is added to aqueous sodium carbonate.

The mixture is stirred and the temperature of the mixture is measured for 4.0 minutes.

The results are shown.



Which statement about the reaction is correct?

A The reaction is endothermic.

B The reaction is exothermic.

C The reaction started after 1.5 minutes.

D The reaction transfers thermal energy to the surroundings.

21 A large piece of limestone ($CaCO_3$) is reacted with hydrochloric acid.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

Which change to the reaction conditions increases the rate of this reaction?

A Decrease the concentration of the acid.

B Decrease the temperature by 10 °C.

C Double the volume of acid used.

D Grind up the limestone into a fine powder.

22 When sulfur dioxide dissolves in water, an acidic solution is formed.

Which ions cause the solution to be acidic?

A hydrogen ions

B hydroxide ions

C oxide ions

D sulfate ions

23 Elements in Group VII of the Periodic Table are known as the halogens.

The elements exist as covalent molecules.

Which word describes these molecules?

A alkaline

B diatomic

C organic

D unreactive

24 Which statements about the uses of aluminium are correct?

1 It is used in the manufacture of aircraft because it has a low density.

2 It is used in the manufacture of aircraft because it is a good conductor of electricity.

3 It is used in the manufacture of overhead power cables because it has a low density.

4 It is used to make food containers because it is a good conductor of electricity.

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

25 Metal P does not react with water but it does react slowly with dilute hydrochloric acid.

Metal Q reacts rapidly with cold water.

Metal R does not react with dilute hydrochloric acid.

Metal S reacts slowly with cold water but it reacts rapidly with steam.

Which row lists the metals in order of decreasing reactivity?

	most reactive →			least reactive
A	Q	P	S	R
B	Q	S	P	R
C	R	P	S	Q
D	R	S	P	Q

26 Fraction M and fraction N are obtained by the fractional distillation of petroleum.

Fraction M is collected higher up the fractionating tower than fraction N.

Fraction M is used as a lubricant.

Which statement about fraction N is correct?

A It has a lower boiling point than M.

B It is used as a fuel for cars.

C It is used as aircraft fuel.

D It is used for making roads.

27 Which statement about alkene molecules is correct?

A They are able to add to each other to produce polymers.

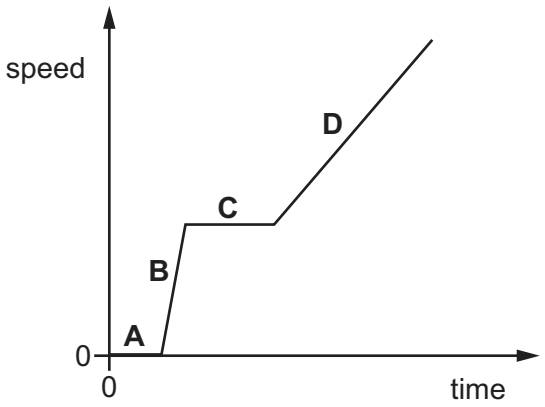
B They are saturated.

C They contain carbon, hydrogen and oxygen atoms.

D They only have single bonds between the atoms.

28 The speed–time graph shows the motion of a body.

Which part of the graph shows the body at rest?



29 The table shows the gravitational field strengths on the surface of four different planets.

planet	gravitational field strength / N/kg
Jupiter	24.8
Neptune	11.2
Saturn	10.4
Uranus	8.7

On which planet does an object of mass 25 kg have a weight of 280.0 N?

A Jupiter

B Neptune

C Saturn

D Uranus

30 The table shows the densities and the masses of four different blocks of metal.

Which block has the greatest volume?

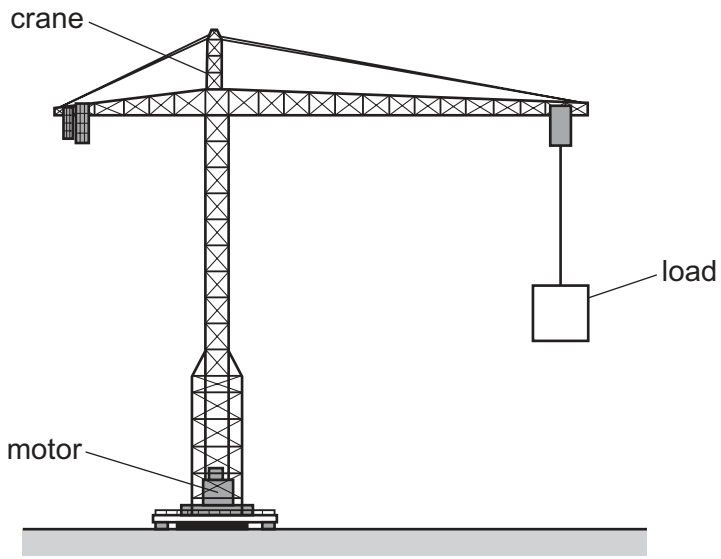
	density / g/cm^3	mass / g
A	3	7
B	8	16
C	19	57
D	21	54

31 A force is applied to an object on a frictionless surface. The force produces an acceleration of $3\,m/s^2$.

What are possible values for the applied force and for the mass of the object?

	force / N	mass / kg
A	2	5
B	2	6
C	5	2
D	6	2

32 A crane has a motor that is used to lift a load. The motor uses diesel oil as fuel.



Which energy transfers occur as the load is lifted?

A chemical to gravitational potential to kinetic

B chemical to kinetic to gravitational potential

C kinetic to chemical to gravitational potential

D kinetic to gravitational potential to chemical

33 When boiling water is poured quickly into a cold glass jar, the glass jar may crack.

Why is this?

A Glass is a good conductor of heat making the glass jar expand too quickly.

B Glass is a good radiator of heat making the glass jar expand too quickly.

C Glass is a poor conductor of heat making the inside of the glass jar expand faster than the outside.

D Glass is a poor radiator of heat making the inside of the glass jar expand faster than the outside.

34 Which row gives an example of a transverse wave and gives the direction of particle vibration?

	example of a transverse wave	direction of particle vibration
A	sound waves	at right angles to the direction of energy transfer
B	sound waves	parallel to the direction of energy transfer
C	water waves	at right angles to the direction of energy transfer
D	water waves	parallel to the direction of energy transfer

35 Which statement is correct for electromagnetic radiation in a vacuum?

A The radiation with the highest frequency travels at the greatest speed.

B The radiation with the lowest frequency travels at the greatest speed.

C The radiation with the highest frequency has the longest wavelength.

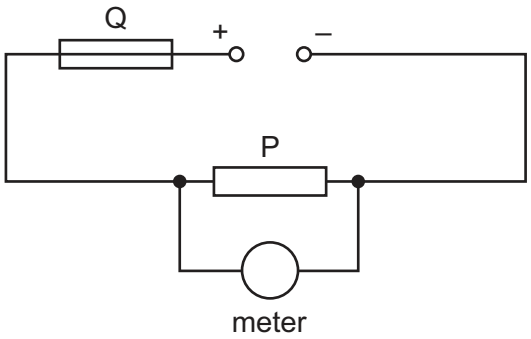
D The radiation with the lowest frequency has the longest wavelength.

36 A charge of 20 C passes through a resistor in a time of 50 s.

What is the current in the resistor?

A 0.4 A **B** 0.4 V **C** 1000 A **D** 1000 V

37 The diagram shows part of an electrical circuit. The symbol for the meter is incomplete.



The meter measures potential difference.

What are the names of components P, Q and the meter?

	P	Q	meter
A	fuse	resistor	ammeter
B	fuse	resistor	voltmeter
C	resistor	fuse	ammeter
D	resistor	fuse	voltmeter

38 Four kettles have different power ratings.

The energy transferred to thermal energy in a given time for each kettle is shown in the table.

Which kettle has the highest power rating?

	energy transferred / J	time / s
A	1000	2
B	3000	2
C	4000	5
D	6000	5

39 What does the nucleus of an atom of carbon contain?

A neutrons only

B protons only

C protons and electrons only

D protons and neutrons only

[Turn over

40 Which row correctly compares the mass and the type of charge of an alpha particle with the mass and the type of charge of a beta particle?

	mass of an alpha particle	type of charge of an alpha particle
A	larger than a beta particle	opposite to a beta particle
B	smaller than a beta particle	opposite to a beta particle
C	larger than a beta particle	same as a beta particle
D	smaller than a beta particle	same as a beta particle

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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.).