Cambridge Assessment International Education

Cambridge IGCSE™

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice (Core) **February/March 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

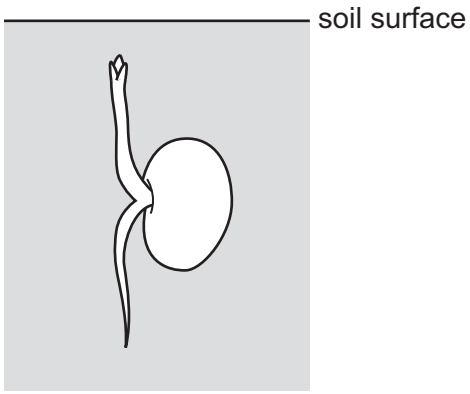
- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the 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 The diagram shows a germinating seed below the soil surface.



Which characteristic of living organisms ensures that the shoot grows upwards and the root grows downwards?

A excretion

B nutrition

C reproduction

D sensitivity

2 What is the net movement of molecules during diffusion?

A from a higher concentration to a lower concentration down a concentration gradient

B from a higher concentration to a lower concentration up a concentration gradient

C from a lower concentration to a higher concentration down a concentration gradient

D from a lower concentration to a higher concentration up a concentration gradient

3 Which smaller molecules is glycogen made from?

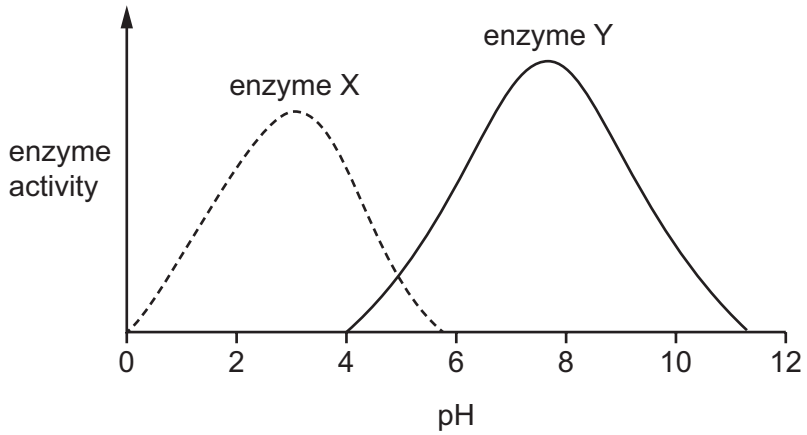
A amino acids

B fatty acids

C glucose

D glycerol

4 The graph shows the effect of pH on two different enzymes.



Which statement is correct?

A Both enzymes show no activity in conditions of pH 4.

B Both enzymes are active in conditions of pH 5.

C Only enzyme X is active in conditions of pH 10.

D Only enzyme Y is active in conditions of pH 3.

5 Which word is missing from the word equation for photosynthesis?

carbon dioxide + ... → glucose + oxygen

A carbohydrate

B chlorophyll

C light

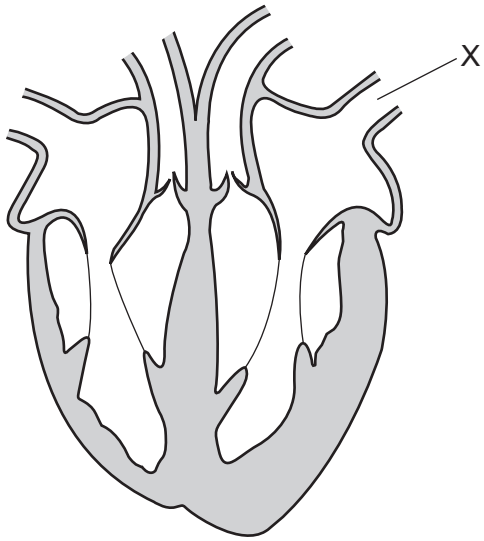
D water

6 Calcium and iron are components of the diet.

Which parts of the body need these components?

	dietary component	
	calcium	iron
A	blood	bone
B	bone	skin
C	bone	blood
D	skin	bone

7 The diagram shows a section through the human heart and the blood vessels associated with it.



Which row names vessel X and correctly describes the direction of blood flow in vessel X?

	vessel X	direction of blood flow
A	pulmonary vein	away from the lungs and towards the heart
B	pulmonary vein	towards the lungs and away from the heart
C	vena cava	away from the lungs and towards the heart
D	vena cava	towards the lungs and away from the heart

8 What is used to test for the presence of carbon dioxide?

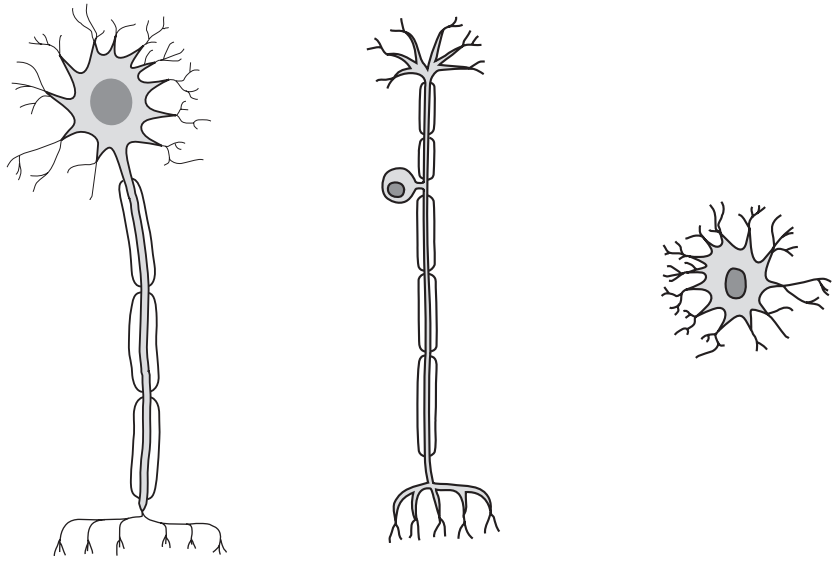
A Benedict's solution

B ethanol

C iodine solution

D limewater

9 The diagram shows three different neurones which form the reflex arc.



X Y Z

Which row correctly identifies X, Y and Z?

	neurone X	neurone Y	neurone Z
A	motor	relay	sensory
B	motor	sensory	relay
C	sensory	motor	relay
D	sensory	relay	motor

10 Which statements about asexual reproduction are correct?

1 It involves gametes.

2 It produces genetically identical offspring.

3 It only requires one parent.

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

11 What is the correct term for an allele that is always expressed in the phenotype if it is present?

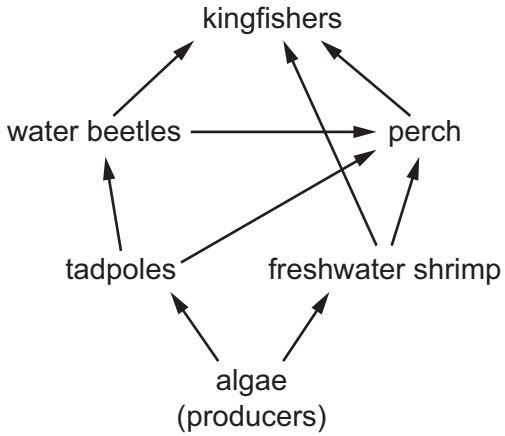
A dominant

B heterozygous

C homozygous

D recessive

12 The diagram shows a food web.



Which animals are carnivores?

A kingfishers, perch and water beetles

B kingfishers only

C perch and water beetles only

D tadpoles and freshwater shrimp

13 Which process is **not** part of the carbon cycle?

A combustion

B fossilisation

C transpiration

D photosynthesis

14 Which change is a chemical change?

A combustion of hydrocarbons

B filling a balloon with air

C freezing a glass of water

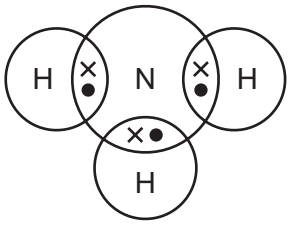
D mixing salt and sand

15 Which row shows the particles in the nucleus of an atom of $^{25}_{12}Mg$?

	protons	neutrons
A	12	12
B	12	13
C	13	12
D	13	13

16 Which dot-and-cross diagram represents a molecule of ammonia?

A



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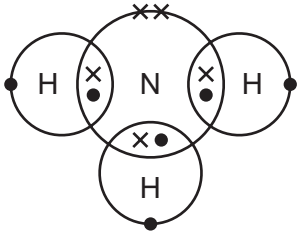

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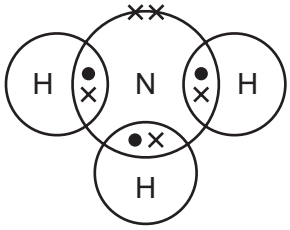
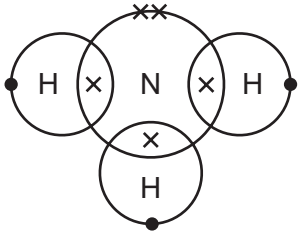
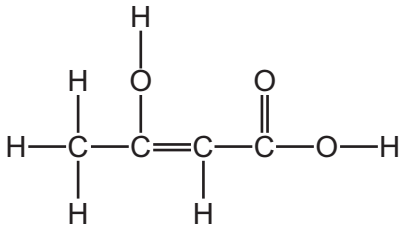


D



17 The structure of a molecule of an organic compound is shown.



What is the formula of this compound?

A $C_4H_4O_3$ **B** $C^4H^4O^3$ **C** $C_4H_6O_3$ **D** 4C6H3O

18 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

Which row describes observations of the tests on the gases collected at the electrodes?

	anode gas	cathode gas
A	turns damp red litmus paper blue	‘pops’ with a lighted splint
B	turns damp red litmus paper blue	relights a glowing splint
C	turns damp red litmus paper white	‘pops’ with a lighted splint
D	turns damp red litmus paper white	relights a glowing splint

19 In a test-tube, magnesium reacts with dilute hydrochloric acid to form a salt and hydrogen.

The reaction makes the test-tube warm.

Which statement about the reaction explains this observation?

A It is a combustion reaction.

B It is a neutralisation reaction.

C It is endothermic.

D It is exothermic.

20 Which statement explains why the rusting of iron is an oxidation reaction?

A Iron gains oxygen.

B Iron is a transition element.

C Iron is very reactive.

D Iron loses oxygen.

21 What reacts with ammonia gas?

	hydrochloric acid	sodium hydroxide
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = reacts

✗ = does not react

22 The halogens are elements in Group VII of the Periodic Table.

They are .....1..... non-metals.

They become .....2..... in colour down the group.

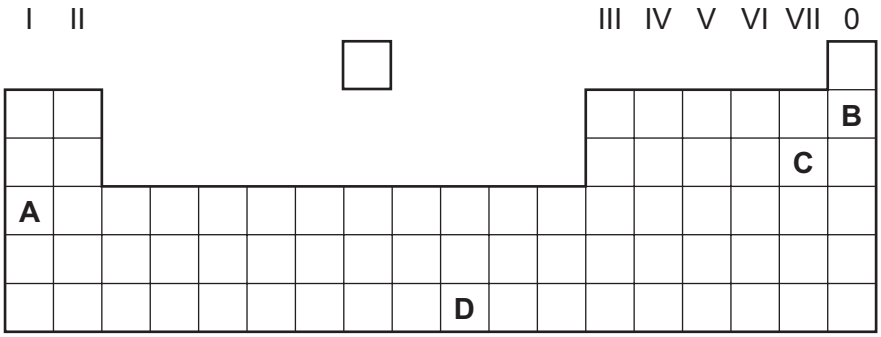
Which words complete gaps 1 and 2?

	1	2
A	diatomic	darker
B	diatomic	lighter
C	monatomic	darker
D	monatomic	lighter

23 Element X increases the rate of some reactions.

Element X is unchanged at the end of these reactions.

What is the position of element X in the Periodic Table?



24 Which statement about aluminium is correct?

A It is extracted from bauxite by heating with carbon.

B It is extracted from bauxite by electrolysis.

C It is extracted from hematite by heating with carbon.

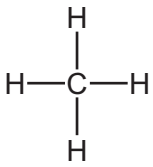
D It is extracted from hematite by electrolysis.

25 Which colours are observed when water is added to white copper(II) sulfate and to blue cobalt(II) chloride?

	copper(II) sulfate	cobalt(II) chloride
A	white	pink
B	white	white
C	blue	pink
D	blue	white

26 Which structure represents the main constituent of natural gas?

A



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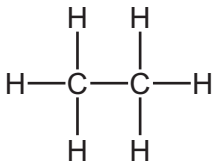
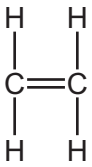


C



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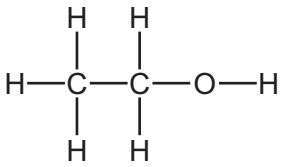


27 Which substance reacts with ethene to produce ethanol?

A bromine

B hydrogen

C oxygen

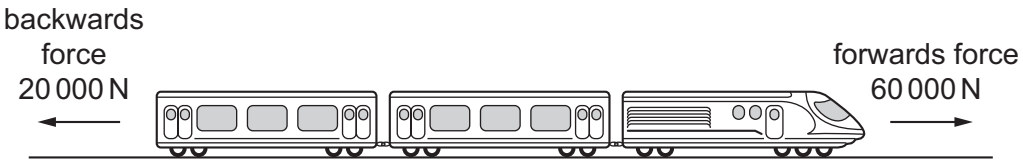
D steam

28 A car travels 100 m in the first 10 s of a journey and 300 m in the next 15 s.

What is the average speed of the car for this 25 s journey?

A 5.0 m/s **B** 8.0 m/s **C** 15 m/s **D** 16 m/s

29 A train travels along a horizontal track at constant speed. Two of the forces acting on the train are shown.



A force of air resistance is also acting on the train to give it a resultant force of zero.

What is this air resistance force?

A 40 000 N backwards

B 80 000 N backwards

C 40 000 N forwards

D 80 000 N forwards

30 Some energy resources do not require a rotating turbine when used to generate electricity.

Which energy resource does **not** require a rotating turbine?

A geothermal

B nuclear

C solar

D wind

31 In a liquid-in-glass thermometer, which physical property of the liquid is used to measure temperature?

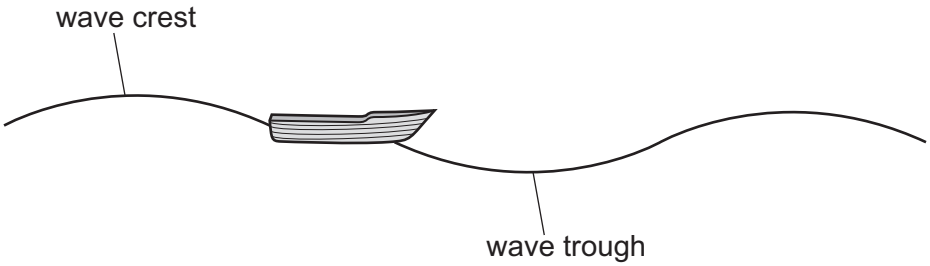
A colour

B mass

C pressure

D volume

32 A boy watches a water wave passing a boat that is floating on the sea.



Which single measurement allows the boy to be able to calculate the amplitude of the wave?

A the distance between one wave crest and the next

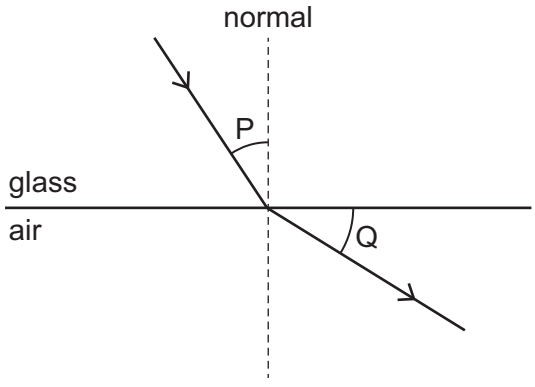
B the time taken for a wave crest to travel the length of the boat

C the time taken for the boat to move from its lowest point to its highest point

D the vertical distance between the highest point and the lowest point of the boat

33 The diagram shows a ray of light passing from glass into air.

Two angles P and Q are labelled.



What is the angle of refraction?

A P **B** Q **C** 90° – P **D** 90° – Q

34 A student claps his hands once when standing 100 m away from a large wall.

The speed of sound in air is 330 m / s.

How long after clapping does the student hear an echo?

A 0.30 s **B** 0.61 s **C** 1.7 s **D** 3.3 s

35 Two charged rods X and Y repel each other.

Which row gives a possible description of how the rods became charged?

	X charged by	Y charged by
A	gaining electrons	gaining electrons
B	gaining electrons	losing protons
C	losing electrons	gaining electrons
D	losing electrons	losing protons

36 There is a current of 4.0 A in a resistor and a potential difference (p.d.) of 12 V across it.

What is the resistance of the resistor?

A 0.33 Ω **B** 3.0 Ω **C** 8.0 Ω **D** 48 Ω

37 The current in an electric heater is 6.0 A when in normal use.

Four fuses with different ratings are available to protect the wire to the heater.

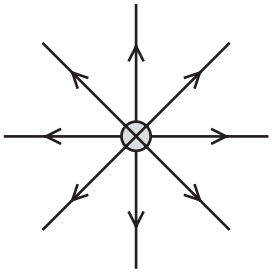
Which fuse is most suitable?

A 1 A **B** 5 A **C** 8 A **D** 20 A

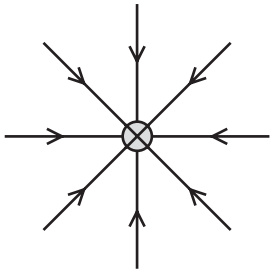
38 The diagrams show the cross-section of a straight wire carrying a current into the page.

Which diagram shows the pattern and direction of the magnetic field around the wire?

A



B



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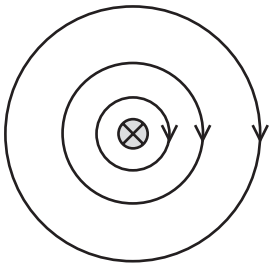

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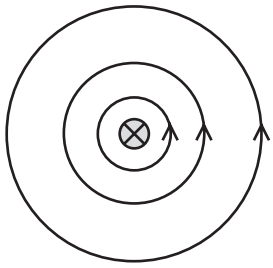

39 A radioactive sample emits 1280 beta (β)-particles per second.

After 20 minutes, it emits 80 beta (β)-particles per second.

What is the half-life of the radioactive sample?

A 4.0 minutes

B 5.0 minutes

C 10 minutes

D 60 minutes

40 A radioactive nucleus emits an alpha (α)-particle.

What happens to the proton number and what happens to the nucleon number of the nucleus?

	proton number	nucleon number
A	decreases by 2	decreases by 4
B	decreases by 2	does not change
C	increases by 1	decreases by 1
D	increases by 1	does not change

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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.).