

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)

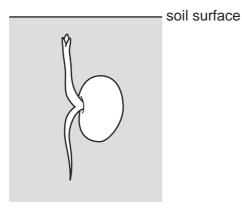
INSTRUCTIONS

- 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.

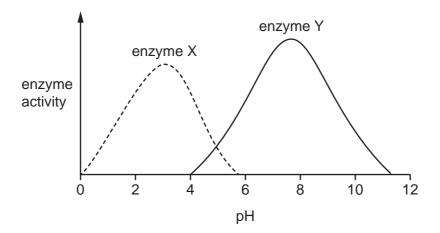
1 The diagram shows a germinating seed below the soil surface.



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?

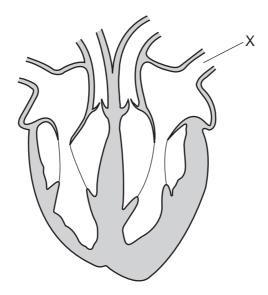
- A Both enzymes show no activity in conditions of pH4.
- **B** Both enzymes are active in conditions of pH 5.
- **C** Only enzyme X is active in conditions of pH 10.
- **D** Only enzyme Y is active in conditions of pH 3.
- **5** Which word is missing from the word equation for photosynthesis?

- 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 c	omponent
	calcium	iron
Α	blood	bone
В	bone	skin
С	bone	blood
D	skin	bone

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

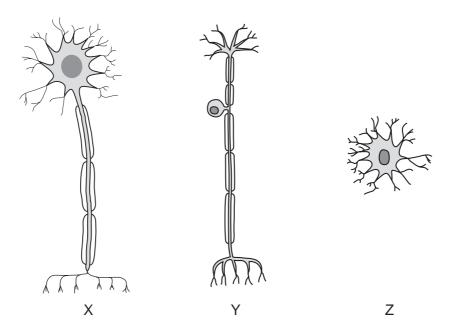


Which row names vessel X and correctly describes the direction of blood flow in vessel X?

	vessel X	direction of blood flow
Α	pulmonary vein	away from the lungs and towards the heart
В	pulmonary vein	towards the lungs and away from the heart
С	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.

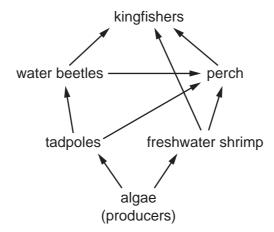


Which row correctly identifies X, Y and Z?

	neurone X	neurone Y	neurone Z
Α	motor	relay	sensory
В	motor	sensory	relay
С	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.

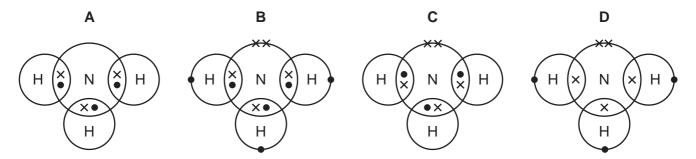


Which animals are carnivores?

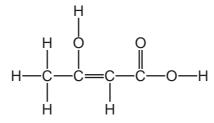
- A kingfishers, perch and water beetles
- **B** kingfishers only
- C perch and water beetles only
- **D** tadpoles and freshwater shrimp
- 13 Which process is **not** part of the carbon cycle?
 - **A** combustion
 - **B** fossilisation
 - C transpiration
 - **D** photosynthesis
- **14** Which change 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
Α	12	12
В	12	13
С	13	12
D	13	13

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



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



What is the formula of this compound?

- **A** C₄H₄O₃
- **B** $C^4H^4O^3$
- \mathbf{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
Α	turns damp red litmus paper blue	'pops' with a lighted splint
В	turns damp red litmus paper blue	relights a glowing splint
С	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 hydrochloric acid to form a salt acid to for
--

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	
Α	✓	✓	key
В	✓	X	✓ = reacts
С	X	✓	x = does not react
D	x	X	

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

They are1..... non-metals.

They become2..... in colour down the group.

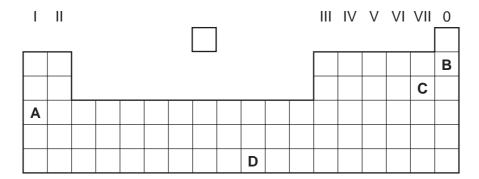
Which words complete gaps 1 and 2?

	1	2
Α	diatomic	darker
В	diatomic	lighter
С	monatomic	darker
D	monatomic	lighter

23 Element X increases the rate of some reactions.

Element X is unchanged at the end of these reactions.

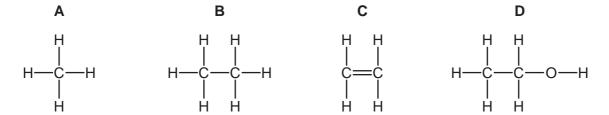
What is the position of element X in the Periodic Table?



- 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
Α	white	pink
В	white	white
С	blue	pink
D	blue	white

26 Which structure represents the main constituent of natural gas?

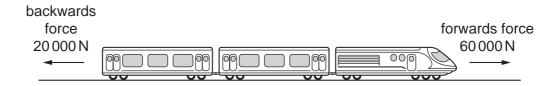


27 Which substance reacts with ethene to produce eth
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- **A** bromine
- **B** hydrogen
- C oxygen
- **D** steam
- 28 A car travels 100 m in the first 10 s of a journey and 300 m in the next 15 s.

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** 16m/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.

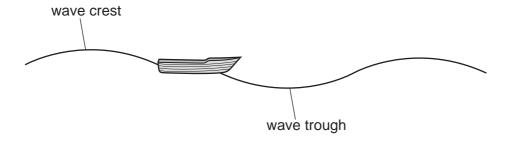
What is this air resistance force?

- A 40 000 N backwards
- B 80000 N backwards
- C 40000 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

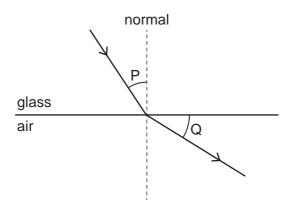
- **31** In a liquid-in-glass thermometer, which physical property of the liquid is used to measure temperature?
 - A colour
 - **B** mass
 - C pressure
 - **D** volume
- **32** A boy watches a water wave passing a boat that is floating on the sea.



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.



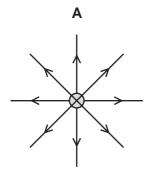
What is the angle of refraction?

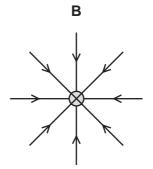
- **A** P
- **B** Q
- **C** 90° P
- $\mathbf{D} \quad 90^{\circ} \mathbf{Q}$

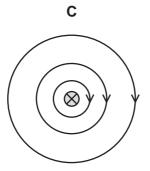
A student claps his hands once when standing 100 m away from a large wall.									
The speed of sound in air is 330 m/s.									
How long after clapping does the student hear an echo?									
A 0.30s B 0.61s C 1.7s D 3.3s						3.3 s			
_									
5 Two charged rods X and Y repel each other.									
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 ele	ctror	ıs	losing protons					
The	re is a current o	of 4.0	A in	a resistor a	and a	poten	tial differen	ice	(p.d.) of 12 V across it.
What is the resistance of the resistor?									
Α	0.33Ω	В	3.0	Ω	С	8.0Ω	I	D	48Ω
The	current in an e	lectr	ic hea	ater is 6.0 A	whe	en in no	ormal use.		
Four fuses with different ratings are available to protect the wire to the heater.									
Which fuse is most suitable?									
Α	1 A	В	5A		С	8 A	I	D	20 A
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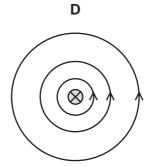
38 The diagrams show the cross-section of a straight wire carrying a current into the page.

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









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
Α	decreases by 2	decreases by 4
В	decreases by 2	does not change
С	increases by 1	decreases by 1
D	increases by 1	does not change

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The Periodic Table of Elements

1	
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	seaborgium

71	Ľ	Iutetium	175	103	۲	lawrencium	ı
20	Υp	ytterbium	173	102	9	nobelium	ı
69	Ш	thulium	169	101	Md	mendelevium	I
89	ш	erbinm	167	100	Fn	fermium	I
29	웃	holmium	165	66	Es	einsteinium	ı
99	ò	dysprosium	163	86	ರ	californium	ı
65	ФL	terbium	159	26	益	berkelium	ı
64	P G	gadolinium	157	96	S	curium	I
63	Еn	europium	152	92	Am	americium	I
62	Sm	samarium	150	94	Pn	plutonium	ı
61	Pm	promethium	I	93	ď	neptunium	ı
09	PN	neodymium	144	92	\supset	uranium	238
29	P	praseodymium	141	91	Ра	protactinium	231
28	Ce	cerium	140	06	T	thorium	232
22	Гa	lanthanum	139	89	Ac	actinium	I

lanthanoids

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).