



Cambridge IGCSE™

CO-ORDINATED SCIENCES

0654/01

Paper 1 Multiple Choice (Core)

For examination from 2025

SPECIMEN PAPER

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.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m/s^2).

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.

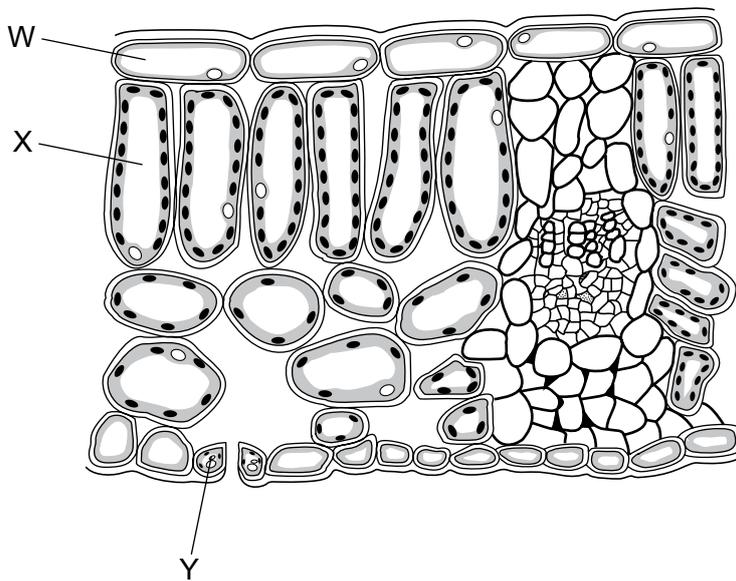
This document has **16** pages.



1 Which row shows active transport?

	particles move from high concentration to low concentration	particles move from low concentration to high concentration	requires energy
A	x	✓	x
B	✓	x	x
C	x	✓	✓
D	✓	x	✓

2 Which row shows the correct labels on the diagram of a leaf section?



	W	X	Y
A	cuticle	palisade mesophyll	stoma
B	epidermis	palisade mesophyll	guard cell
C	cuticle	spongy mesophyll	guard cell
D	epidermis	spongy mesophyll	stoma

3 Which disease can be caused by a lack of vitamin C?

- A** AIDS
- B** coronary heart disease
- C** rickets
- D** scurvy

- 4 A student inflates balloons by exhaling into them.

What is the approximate composition of the air in the balloons?

	percentage of oxygen	percentage of carbon dioxide	water vapour
A	16	0.04	low
B	16	4.5	high
C	21	0.04	high
D	21	4.5	low

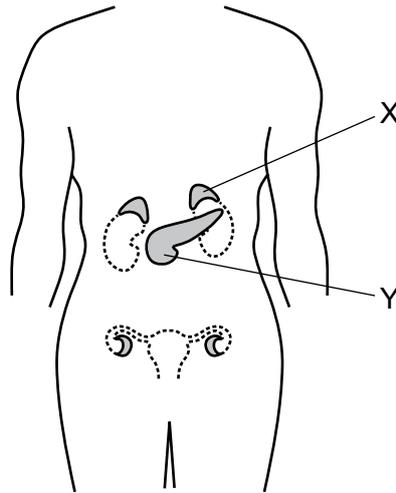
- 5 A student writes the following sentences.

- 1 During aerobic respiration, oxygen is used to break down nutrient molecules to release energy.
- 2 Energy is needed for muscle contraction, protein synthesis and cell division.
- 3 The passage of nerve impulses does **not** require energy.

Which sentences are correct?

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

6 The diagram shows the position of different endocrine glands in the human body.



Which row shows the correct label for each endocrine gland and the hormone that the gland secretes?

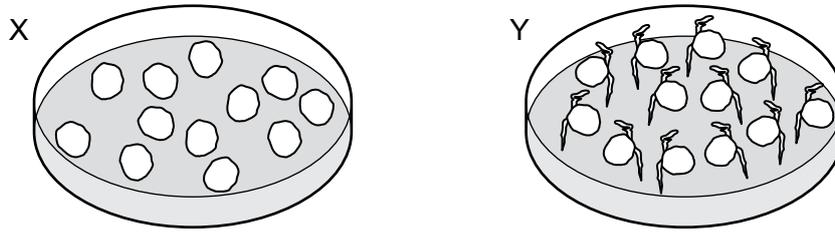
	X		Y	
	gland	hormone	gland	hormone
A	adrenal	adrenaline	ovary	insulin
B	adrenal	adrenaline	pancreas	insulin
C	pancreas	insulin	adrenal	adrenaline
D	ovary	insulin	pancreas	adrenaline

7 What is meant by antibiotic resistance?

- A** No bacteria will be killed by any antibiotic.
- B** Only some bacteria will be killed by some antibiotics.
- C** No viruses will be killed by any antibiotic.
- D** Only some viruses will be killed by some antibiotics.

- 8 A student investigates two conditions needed for seeds to germinate. All the seeds are given water.

Which conditions would give the results shown in diagrams X and Y?



	X	Y
A	carbon dioxide, 25 °C	oxygen, 25 °C
B	carbon dioxide, 2 °C	oxygen, 2 °C
C	oxygen, 25 °C	carbon dioxide, 25 °C
D	oxygen, 2 °C	carbon dioxide, 2 °C

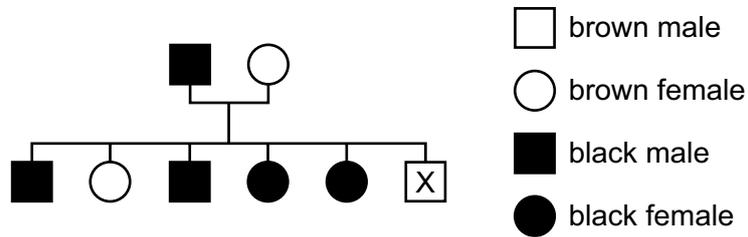
- 9 Which of the following occur due to increased secretion of testosterone during puberty in male humans?

- 1 increased growth rate
- 2 increased muscle development
- 3 pubic and underarm hair growth
- 4 voice deepens

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

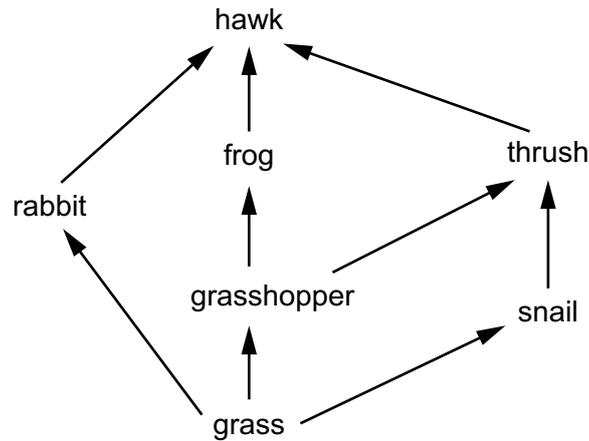
- 10 In some dogs, brown coat colour is dominant to black. Two dogs of different colours breed together. Six offspring were produced as shown in the diagram.

If the male labelled X is later mated to a black female, what ratio of coat colour would be expected in the offspring?



- A all black
 B all brown
 C 3:1 brown : black
 D 1:1 brown : black
- 11 What is the definition of a gene?
- A all the DNA in a cell that controls metabolic reactions
 B a length of DNA that codes for a protein
 C the nucleus and its chromosomes
 D all the DNA in a cell that determines the inheritance of sex

- 12 Humans can have an impact on the environment when they add or remove certain species. The hawks are removed from the food web shown.



What is the effect of removing hawks on the number of grasshoppers and rabbits?

	number of grasshoppers	number of rabbits
A	no change	decreases
B	decreases	increases
C	decreases	no change
D	increases	increases

- 13 What is meant by the term biodiversity?

- A** an increase in the number of different species that live in an area
- B** how organisms and their environment interact
- C** the number of different animals that live in an area
- D** the number of different species that live in an area

- 14 Which two elements react together to form an ionic compound?

element	electronic structure
R	2,4
T	2,8
X	2,8,1
Z	2,8,7

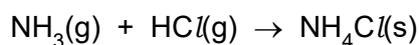
- A** R and T **B** T and X **C** X and Z **D** Z and R

- 15** Aluminium sulfate contains aluminium, sulfur and oxygen.
In aluminium sulfate, there are six times as many oxygen atoms as aluminium atoms.
In aluminium sulfate, there are four times as many oxygen atoms as sulfur atoms.

What is the formula of aluminium sulfate?

- A** $Al_2(SO_4)_3$
- B** $Al_2(SO_3)_4$
- C** $Al_3(SO_4)_2$
- D** $Al_4(SO_3)_2$

- 16** The equation for the reaction of ammonia, NH_3 , and hydrogen chloride, HCl , is shown.



When 1.7 g of ammonia is used, 5.35 g of ammonium chloride, NH_4Cl , is produced.

What is the mass of hydrogen chloride that reacts with 5.1 g of ammonia?

- A** 3.65 g
- B** 10.95 g
- C** 7.05 g
- D** 21.15 g

- 17** Molten lead(II) bromide is electrolysed using inert electrodes.

Which row identifies the product at each electrode?

	cathode	anode
A	bromide ions	lead ions
B	bromine	lead
C	lead ions	bromide ions
D	lead	bromine

18 Hydrogen–oxygen fuel cells are used to power vehicles.

Which row identifies the chemical product of the fuel cell and the type of energy used to power the vehicles?

	chemical product	type of energy
A	hydrogen	electrical
B	hydrogen	thermal
C	water	electrical
D	water	thermal

19 During a reaction, the temperature of the reaction mixture decreases.

Which statement about the reaction is correct?

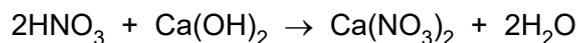
- A** It is endothermic and thermal energy is absorbed from the surroundings.
- B** It is endothermic and thermal energy is transferred to the surroundings.
- C** It is exothermic and thermal energy is absorbed from the surroundings.
- D** It is exothermic and thermal energy is transferred to the surroundings.

20 Which statement about catalysts is correct?

- A** They decrease the time taken for a reaction to finish and they are unchanged at the end of the reaction.
- B** They decrease the time taken for a reaction to finish and they are used up in the reaction.
- C** They increase the time taken for a reaction to finish and they are unchanged at the end of the reaction.
- D** They increase the time taken for a reaction to finish and they are used up in the reaction.

- 21 Dilute nitric acid is mixed with excess aqueous calcium hydroxide in a test-tube containing the indicator methyl orange.

The equation for the reaction is shown.



Which row shows the type of reaction that occurs and the colour of the mixture at the end of the reaction?

	type of reaction	colour
A	neutralisation	orange
B	neutralisation	yellow
C	redox	orange
D	redox	yellow

- 22 Which statement explains why elements in the same group of the Periodic Table have similar chemical properties?

- A** They have different numbers of protons.
- B** They have the same number of neutrons.
- C** They have the same number of electron shells.
- D** They have the same number of outer-shell electrons.

- 23 Which row shows the correct order of reactivity for the elements?

	most reactive	—————→			least reactive
A	silver	calcium	carbon	potassium	
B	silver	carbon	calcium	potassium	
C	sodium	hydrogen	zinc	gold	
D	sodium	zinc	hydrogen	gold	

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

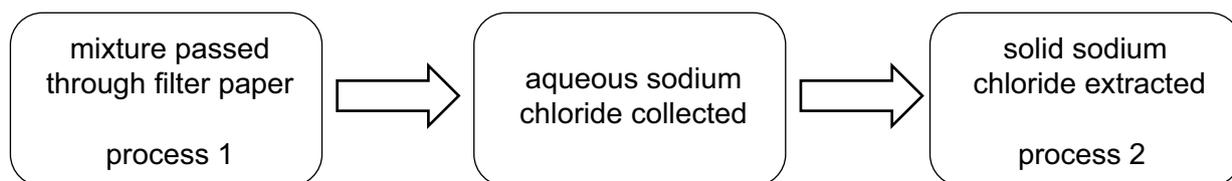
- A** blue to white
- B** blue to pink
- C** white to blue
- D** pink to blue

25 Which statements about air pollutants are correct?

- 1 Carbon monoxide comes from the complete combustion of carbon-containing fuels.
- 2 Oxides of nitrogen come from digestion in animals.
- 3 Methane comes from the decomposition of vegetation.
- 4 Particulates come from the incomplete combustion of carbon-containing fuels.

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

26 A mixture contains aqueous sodium chloride and an insoluble salt. Two processes are used to extract solid sodium chloride from the mixture. The diagram shows the processes used.



Which row describes aqueous sodium chloride in process 1 and the name of process 2?

	aqueous sodium chloride	process 2
A	residue	evaporation
B	residue	filtration
C	filtrate	evaporation
D	filtrate	filtration

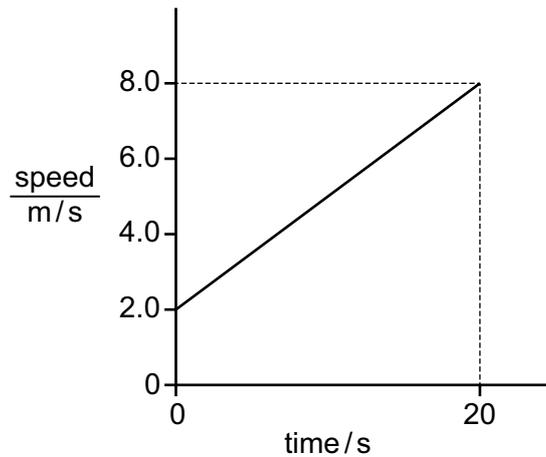
27 Aqueous potassium iodide is acidified with dilute nitric acid.

What is observed when aqueous silver nitrate is added to this mixture?

- A white precipitate
 B white solution
 C yellow precipitate
 D yellow solution

28 The graph shows how the speed of a car varies with time.

What is the distance travelled by the car in the 20 s shown?



- A 80 m
- B 100 m
- C 160 m
- D 200 m

29 A solid block has a mass of 10 g and a volume of 5.0 cm^3 .

The block is lowered into a liquid of density 1.5 g/cm^3 .

What is the density of the block and does it float or sink in the liquid?

	<u>density of block</u> g/cm^3	floats or sinks
A	0.50	floats
B	0.50	sinks
C	2.0	floats
D	2.0	sinks

30 A machine does work W by transferring energy ΔE in a time t .

Which equation is used to calculate the power P of the machine?

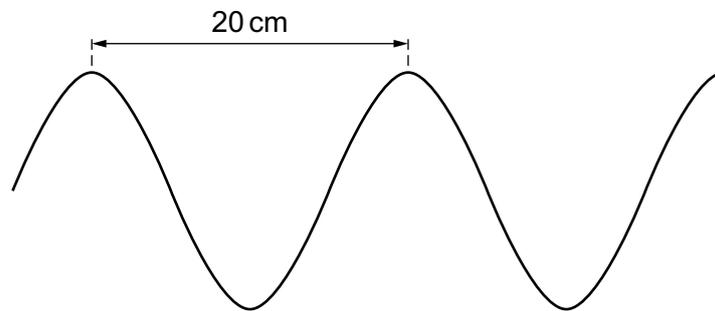
- A $P = \Delta E \times t$
- B $P = W \times t$
- C $P = \frac{\Delta E}{t}$
- D $P = \frac{W}{\Delta E}$

- 31 The particles in a substance are close together and can move around.

The substance changes state so that the particles are still close together but become fixed in a pattern.

What is the name of the change of state?

- A condensation
 - B evaporation
 - C melting
 - D solidification
- 32 The diagram represents a wave. The frequency of the wave is 30 Hz.



What is the speed of the wave?

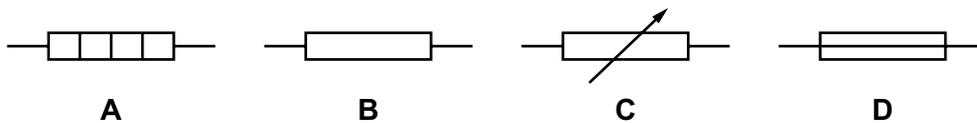
- A 1.5 cm/s
 - B 3.0 cm/s
 - C 300 cm/s
 - D 600 cm/s
- 33 White light is dispersed and produces a visible spectrum of seven colours.
- Which pair contains two of these colours in order of increasing frequency (lower frequency first)?
- A green, red
 - B green, violet
 - C violet, yellow
 - D yellow, red

- 34 A 2.0 kW heater is connected to a mains power supply.
The cost of electricity is \$0.30 per kWh.

What is the total cost of using the heater for 15 minutes?

- A \$0.04
- B \$0.15
- C \$2.40
- D \$9.00

- 35 Which circuit symbol represents a heater?



- 36 The outer casing of a mains electrical appliance is **not** earthed.
The appliance is working and is safe to use.

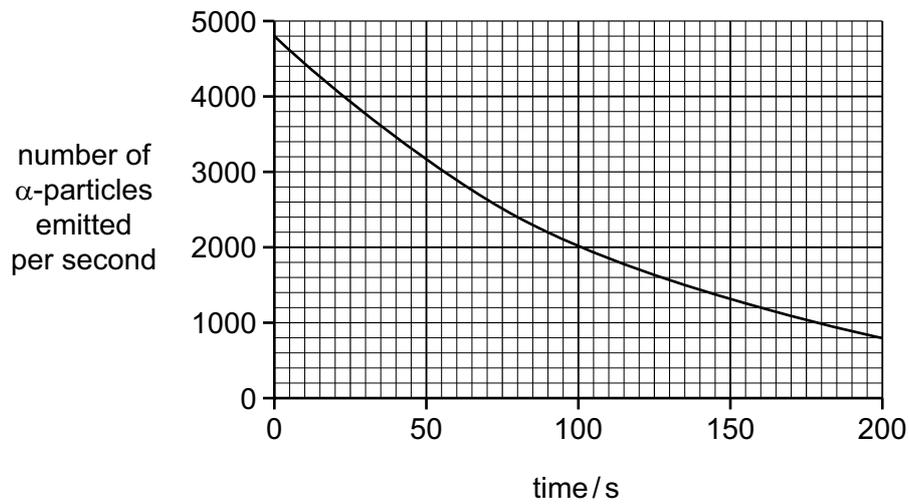
Which statement about the appliance must be correct?

- A It does **not** have a live connection.
 - B It has two fuses.
 - C It has two switches.
 - D It is double-insulated.
- 37 Which row gives the relative charges of electrons and neutrons?

	electrons	neutrons
A	0	0
B	0	-1
C	-1	0
D	-1	+1

- 38 A radioactive isotope emits α -particles. The graph shows how the number of α -particles emitted per second changes with time.

What is the half-life of the isotope?



- A 80 s
 B 100 s
 C 200 s
 D 2400 s
- 39 Which sequence is part of the life cycle of a very large mass star?
- A red giant \rightarrow planetary nebula + neutron star
 B red giant \rightarrow planetary nebula + black hole
 C red supergiant \rightarrow supernova \rightarrow neutron star
 D red supergiant \rightarrow supernova \rightarrow black hole
- 40 What is a light-year?
- A the distance travelled by light in a vacuum in 1 year
 B the distance travelled by light in a vacuum in 100 000 years
 C the time taken for light to travel across the Milky Way
 D the time taken for light to travel from the Sun to the Earth

The Periodic Table of Elements

		Group																																		
	I	II	III						IV	V	VI	VII	VIII																							
	3 Li lithium 7	4 Be beryllium 9	<div style="display: flex; justify-content: space-between;"> <div style="border: 1px solid black; padding: 5px;"> 1 H hydrogen 1 </div> <div style="border: 1px solid black; padding: 5px;"> Key atomic number atomic symbol name relative atomic mass </div> </div>										2 He helium 4																							
	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 —																		

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.).

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