



Cambridge IGCSE[™]

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice (Core)

May/June 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.

1	Which is not a	characteristic of	all living	organisms?
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- A excretion
- **B** growth
- C photosynthesis
- **D** sensitivity
- 2 Which statement about the structures found in animal and plant cells is correct?
 - A Both have cell walls.
 - **B** Only plant cells have a cell membrane.
 - **C** Both have cytoplasm.
 - **D** Only animal cells have a nucleus.
- 3 Which row shows the elements and the small molecules that are used to make the larger molecules?

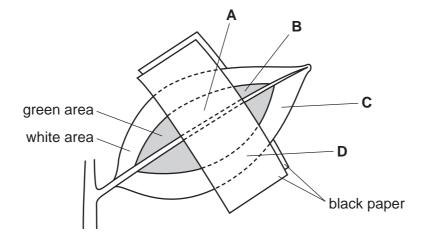
	elements	small molecule	larger molecule
Α	carbon, hydrogen and oxygen	glucose	fats
В	carbon, hydrogen, oxygen and nitrogen	amino acids	fats
С	carbon, hydrogen and oxygen	glucose	proteins
D	carbon, hydrogen, oxygen and nitrogen	amino acids	proteins

- 4 Which type of molecules speed up chemical digestion?
 - A carbohydrates
 - **B** enzymes
 - **C** hormones
 - **D** fatty acids

5 The diagram shows a leaf, still attached to a plant, with both green and white areas that have been partly covered with black paper.

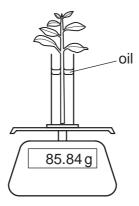
The leaf is left in bright light for six hours and then tested for starch.

Which area of the leaf turns blue-black after the starch test?



- **6** Which nutrient is needed to make strong bones and teeth?
 - A calcium
 - **B** fat
 - C starch
 - **D** fibre

7 The diagram shows a shoot at the start of an experiment investigating transpiration. The mass of the shoot, measuring cylinder, water and oil is measured.



The apparatus is left for three days and then the mass recorded for a second time.

Under which conditions would there be the most loss of mass from the apparatus?

	temperature	humidity
Α	high	high
В	high	low
С	low	high
D	low	low

8 During cold weather, warm blooded animals, such as mammals and birds, require more food.

Which statement explains the reason for this?

	energy required to maintain constant body temperature	rate of respiration
Α	high	high
В	high	low
С	low	high
D	low	low

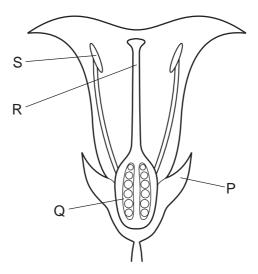
9 A person leaves an air conditioned building.

The temperature of the air conditioned building is 16 °C.

The outside temperature is 39 °C.

Which statement describes one response to the change in temperature?

- A The blood detects the change in temperature and the person starts to shiver.
- **B** The blood detects the change in temperature and the person starts to sweat.
- **C** The brain detects the change in temperature and the person starts to shiver.
- **D** The brain detects the change in temperature and the person starts to sweat.
- **10** The diagram shows a section through a flower.



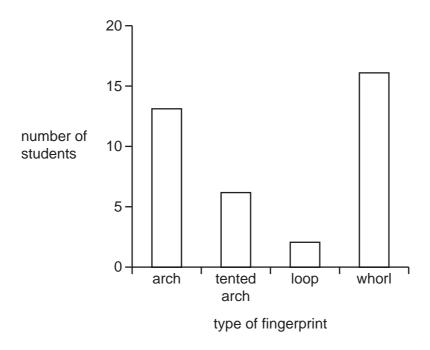
Which labelled structures are the anther and the ovary?

	anther	ovary
Α	R	Р
В	R	Q
С	S	Р
D	S	Q

11 Fingerprints are classified by their shape.

A class of students identified the type of fingerprint they have on the thumb of their left hand.

The chart shows the results.

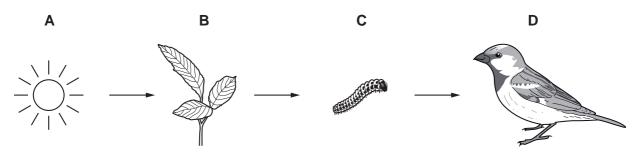


Which statement about the data in the chart is correct?

- A Fingerprints are an example of continuous variation because the data shows a range of phenotypes.
- **B** Fingerprints are an example of continuous variation because the data shows no intermediates.
- **C** Fingerprints are an example of discontinuous variation because the data shows a range of phenotypes.
- **D** Fingerprints are an example of discontinuous variation because the data shows no intermediates.

12 The diagram shows a food chain.

Which is the producer?

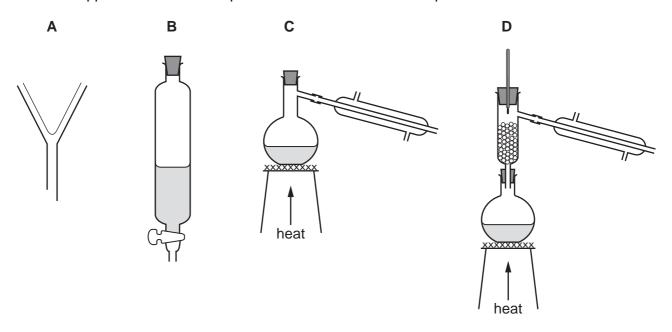


13 Which row about the effects of deforestation is correct?

	risk of flooding	amount of carbon dioxide in atmosphere
Α	decreased	decreased
В	decreased	increased
С	increased	decreased
D	increased	increased

14 Hexane and octane are liquid hydrocarbons that mix together.

Which apparatus is used to separate a mixture of these two liquids?



15 When solid zinc carbonate is heated, a different solid and a gas are formed.

Which type of change occurs?

- A chemical
- **B** exothermic
- C physical
- **D** separation
- **16** An atom of osmium is represented by $^{190}_{76}$ Os.

How many neutrons are in this atom?

- **A** 76
- **B** 114
- **C** 190
- **D** 266

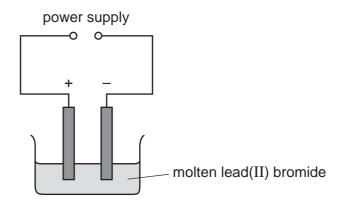
17 The structures of some compounds are shown.

	structure	formula
1	H H H H O H H H H H H H H H H	C ₂ H ₆ O
2	C=0	CO ₂
3	0 H—0—N—0	HNO ₃
4	0=\$=0	SO ₄

In which rows does the formula match the structure?

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

18 Molten lead(II) bromide is electrolysed using inert electrodes as shown.



An element is produced at the negative electrode.

What is the name of the element and of the negative electrode?

	element	negative electrode
Α	bromine	anode
В	bromine	cathode
С	lead	anode
D	lead	cathode

19 Potassium chloride is added to water.

The temperature of the solution decreases as the potassium chloride dissolves.

Which type of reaction occurs?

- A endothermic
- **B** exothermic
- **C** oxidation
- **D** reduction
- 20 Iron is extracted from its ore in the blast furnace.

One of the reactions involved is shown.

$$Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$$

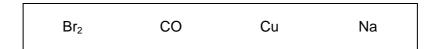
Which statement is correct?

- A Iron(III) oxide and carbon monoxide are both oxidised.
- **B** Iron(III) oxide and carbon monoxide are both reduced.
- **C** Iron(III) oxide is oxidised and carbon monoxide is reduced.
- **D** Iron(III) oxide is reduced and carbon monoxide is oxidised.
- 21 Potassium oxide and sulfur dioxide are both soluble in water.

Which row describes properties of these oxides?

	oxide	oxide pH in aqueous solution					
Α	potassium oxide	14	turns blue				
В	potassium oxide	2	stays red				
С	sulfur dioxide	14	stays red				
D	sulfur dioxide	2	turns blue				

22 The box lists four substances.



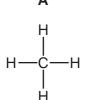
Which substance is an element that forms a basic oxide and coloured compounds?

- A Br₂
- B CO
- **C** Cu
- **D** Na

- 23 Which statement about the treatment of the water supply is correct?
 - A Water from reservoirs and rivers is filtered to remove dissolved impurities.
 - **B** Chlorine is added to the water to kill bacteria.
 - **C** Sodium chloride is added to the water to make it pleasant to drink.
 - **D** Chlorine is added to make the water pure.
- 24 Which element is used in the manufacture of sulfuric acid?
 - A carbon
 - **B** hydrogen
 - C nitrogen
 - **D** sulfur
- 25 Which statements about limestone are correct?
 - 1 It contains calcium oxide.
 - 2 It is used to manufacture lime.
 - 3 It neutralises acidic industrial waste products.
 - 4 It neutralises alkaline soil.
 - **A** 1 and 3
- **B** 1 and 4
- **C** 2 and 3
- **D** 2 and 4
- 26 Naphtha is obtained by the fractional distillation of petroleum.

Which statements about naphtha are correct?

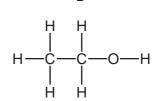
- 1 It burns to form carbon dioxide and water.
- 2 It is a mixture of hydrocarbons.
- 3 It is present in bottled gas.
- 4 The main component of naphtha is methane.
- **A** 1 and 2
- **B** 1 and 4
- **C** 2 and 3
- **D** 3 and 4
- 27 Which diagram represents a molecule that is formed by fermentation?



H H H H — C — C — H



C



D

28 Two children X and Y pull on a rope in opposite directions.

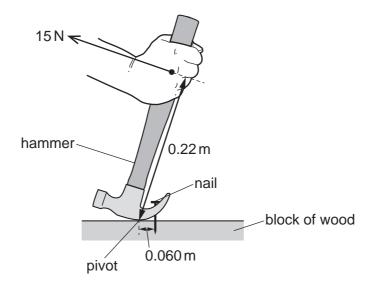
The diagram shows the size of each force and its direction.



What is the resultant force on the rope?

- A 50 N towards X
- B 50 N towards Y
- C 950 N towards X
- **D** 950 N towards Y

29 A boy pulls a nail from a block of wood using a hammer, as shown.



The boy pulls the hammer with a force of 15 N in the position shown.

What is the moment produced about the pivot by the boy pulling on the hammer?

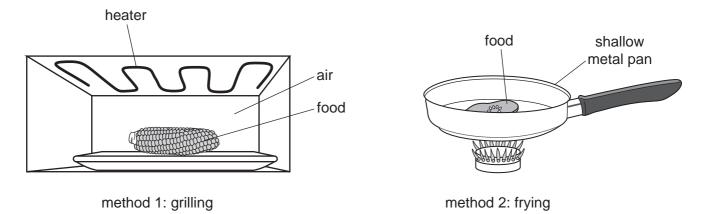
- **A** 0.90 N m
- **B** 2.4 N m
- C 3.3 N m
- **D** 4.2 N m

30 Electricity is generated using different sources of energy.

Which energy source is non-renewable?

- **A** coal
- **B** hydroelectric
- C solar
- **D** wind

- **31** Which statement about gas particles is **not** correct?
 - A Increasing the temperature of a gas makes the gas particles move more slowly.
 - **B** The gas particles are in constant random motion.
 - **C** The pressure of a gas is caused by the collision of gas particles with the container.
 - **D** Very small particles suspended in a gas are in constant random motion.
- 32 Two methods of cooking are grilling under a red-hot heater and frying in a shallow metal pan.



How does thermal energy pass through the air to reach the food in method 1 and how does thermal energy pass through the bottom of the metal pan in method 2?

	method 1	method 2
Α	convection	conduction
В	convection	radiation
С	radiation	conduction
D	radiation	radiation

- 33 What is the name of the distance between two consecutive crests of a water wave?
 - A amplitude
 - **B** frequency
 - C speed
 - **D** wavelength

34 An object is placed in front of a plane mirror on a wall.

What are the characteristics of the image formed?

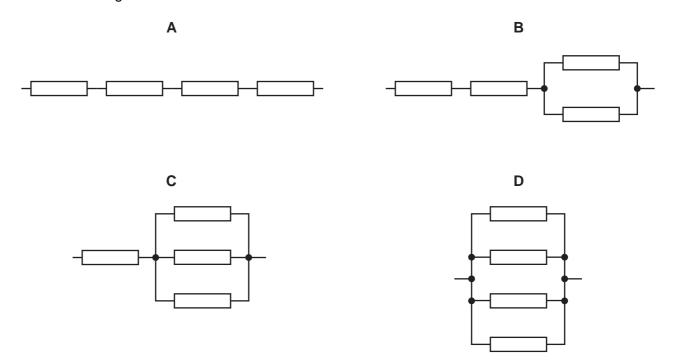
- A same size as object and inverted top to bottom
- **B** same size as object and laterally inverted (left to right)
- **C** smaller than object and inverted top to bottom
- **D** smaller than object and laterally inverted (left to right)
- **35** A plastic rod is rubbed with a cloth and the rod becomes positively charged.

What happens during this process?

- A Negative charges move from the cloth to the rod.
- **B** Negative charges move from the rod to the cloth.
- **C** Positive charges move from the cloth to the rod.
- **D** Positive charges move from the rod to the cloth.
- **36** Which material is used for the core of an electromagnet?
 - **A** aluminium
 - **B** copper
 - C iron
 - **D** steel

37 The diagrams show four identical resistors connected together in different arrangements.

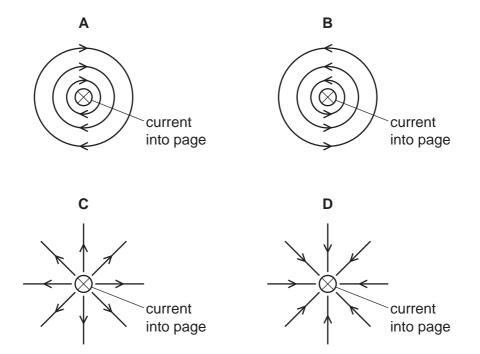
Which arrangement has the smallest combined resistance?



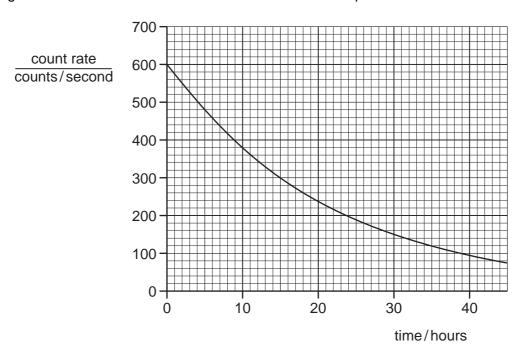
38 There is a current-carrying wire perpendicular to the page.

The direction of the current is into the page.

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



39 The diagram shows how the count rate for a radioactive isotope varies with time.

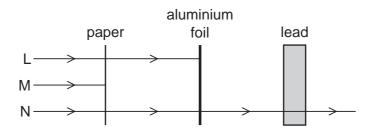


How many half-lives of the isotope elapse in 45 hours?

- **A** 1
- **B** 3
- **C** 45
- **D** 75

40 The diagram represents three types of ionising radiation L, M and N directed towards a sheet of paper, a sheet of aluminium foil and a block of lead.

The diagram shows whether each type of radiation penetrates each of the materials.



Which row identifies the radiations L, M and N?

	L	М	N
Α	α	β	γ
В	α	γ	β
С	β	α	γ
D	β	γ	α

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The Periodic Table of Elements

	=	ه ₂	helium 4	10	Ne	neon 20	18	Ar	argon 40	36	궃	krypton 84	54	Xe	xenon 131	98	Rn	radon -	118	Og	ganesson	
	=					fluorine 19															ennessine og	+
																		_			_	\dashv
	5			80	0	oxygen 16	16	ഗ	sulfur 32	34	Se	seleniun 79	52	Te	tellurium 128	84	Po	poloniun	116	_	livermorium	1
	>			7	Z	nitrogen 14	15	₾	phosphorus 31	33	As	arsenic 75	51	Sb	antimony 122	83	B	bismuth 209	115	Mc	moscovium	ı
	≥			9	O	carbon 12	14	S	silicon 28	32	Ge	germanium 73	20	Sn	tin 119	82	Pb	lead 207	114	Εl	flerovium	ı
	=			5	Δ	boron 11	13	Ρl	aluminium 27	31	Ga	gallium 70	49	<u>u</u>	indium 115	81	11	thallium 204	113	Z	nihonium	1
							1			30	Zu	zinc 65	48	g	cadmium 112	80	Нg	mercury 201	112	ပ်	copernicium	ı
										29	D C	copper 64	47	Ag	silver 108	79	Αu	gold 197	111	Rg	roentgenium	
dn										28	Z	nickel 59	46	Pd	palladium 106	78	귙	platinum 195	110	Ds	darmstadtium	ı
Group										27	ပိ	cobalt 59	45	Rh	rhodium 103	77	<u>-</u>	iridium 192	109	¥	meitnerium	ı
	- I	hydrogen 1							26	Fe	iron 56	44	Ru	ruthenium 101	9/	SO	osmium 190	108	Hs	hassium	ı	
				_						25	Mn	manganese 55	43	ည	technetium -	75	Re	rhenium 186	107	Bh	bohrium	ı
						loc	SS				24	ပ်	chromium 52	42	Mo	molybdenum 96	74	>	tungsten 184	106	Sg	seaborgium
			Key	atomic number	atomic symbo	name relative atomic mass				23	>	vanadium 51	41	g	niobium 93	73	<u>ra</u>	tantalum 181	105	6	dubnium	ı
				g	atoi	relai				22	ï	titanium 48	40	Zr	zirconium 91	72	茔	hafnium 178	104	¥	rutherfordium	-
										21	လွ	scandium 45	39	>	yttrium 89	57–71	lanthanoids		89–103	actinoids		
	=			4	Be	beryllium 9	12	Mg	magnesium 24	20	Ca	calcium 40	38	ഗ്	strontium 88	56	Ba	barium 137	88	Ra	radium	1
	_			3	:=	lithium 7	=	Na	sodium 23	19	¥	potassium 39	37	Rb	rubidium 85	55	S	caesium 133	87	ь	francium	

rı Lu	lutetium 175	103	۲	lawrencium -
Vb Yb	ytterbium 173	102	2	nobelium
e9 Tm	thulium 169	101	Md	mendelevium –
E Ë	erbium 167	100	Fm	fermium -
67 Ho	holmium 165	66	Es	einsteinium –
® Dy	dysprosium 163	86	ŭ	californium -
es Tb	terbium 159	97	ă	berkelium -
64 Gd	gadolinium 157	96	Cm	curium
e3 Eu	europium 152	92	Am	americium -
Sm	samarium 150	94	Pu	plutonium –
Pm	promethium —	93	ď	neptunium —
° P	neodymium 144			
59 Pr	praseodymium 141	91	Ра	protactinium 231
Ce Se	cerium 140	06	Ļ	thorium 232
57 La	lanthanum 139	88	Ac	actinium

lanthanoids

actinoids

The volume of one mole of any gas is $24\,\mathrm{dm}^3$ at room temperature and pressure (r.t.p.).