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Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/23**

Paper 2 Multiple Choice (Extended) **October/November 2022**

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.

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1 What are characteristics of all living organisms?

A breathing, excretion, nutrition

B excretion, growth, nutrition

C reproduction, respiration, germination

D secretion, growth, sensitivity

2 Which row describes a correct structural adaptation for red blood cells and for cells lining the trachea?

	red blood cells	cells lining the trachea
A	nucleus absent	cilia present
B	nucleus present	cilia present
C	nucleus absent	small surface area
D	nucleus present	small surface area

3 From which kind of molecule are enzymes made?

A glucose

B glycogen

C fat

D protein

4 A student investigates the effect of changing the light intensity on the rate of photosynthesis.

Which environmental conditions need to be kept constant in this investigation?

A carbon dioxide concentration, light intensity and temperature

B carbon dioxide concentration and temperature only

C carbon dioxide concentration and light intensity only

D light intensity and temperature only

5 Which condition is caused by a lack of vitamin D?

A anaemia

B constipation

C rickets

D scurvy

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6 Which statement about digestion is correct?

A Chemical digestion occurs in the liver.

B Chemical digestion only occurs in the mouth.

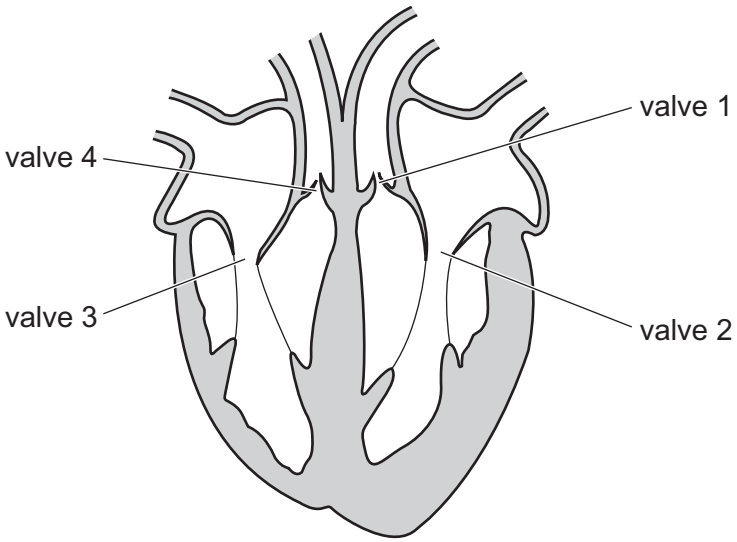
C Mechanical digestion occurs in the large intestine.

D Mechanical digestion occurs in the mouth and stomach.

7 Which row shows the conditions that lead to the **slowest** rate of transpiration of a plant?

	humidity of air / %	temperature of air / °C
A	30	10
B	70	20
C	30	20
D	70	10

8 The diagram shows a section through the heart.



When valve 1 is open, which other valves are open and which are closed?

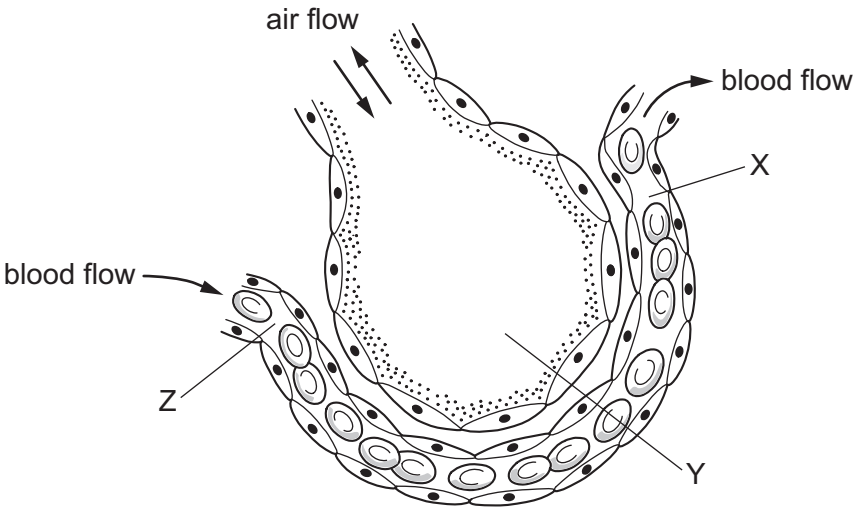
	valve 2	valve 3	valve 4
A	closed	closed	open
B	closed	open	closed
C	open	closed	open
D	open	open	closed

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9 The diagram shows the cross-section of an alveolus in the lung.



Which statement is correct?

A Carbon dioxide levels are higher at Z than at X.

B Carbon dioxide levels are higher at X than at Y.

C Carbon dioxide moves by diffusion from Y into the blood.

D Carbon dioxide moves by osmosis from the blood into Y.

10 What is the word equation for aerobic respiration?

A carbon dioxide + chlorophyll → glucose + oxygen

B carbon dioxide + glucose → oxygen + water

C glucose + oxygen → carbon dioxide + water

D oxygen + light energy → carbon dioxide + water

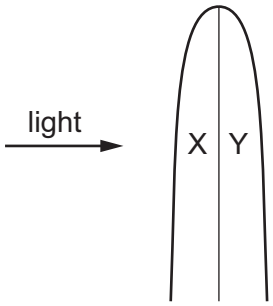
11 How does the body respond to being frightened?

	decreased blood glucose concentration	increased breathing rate	increased pulse rate	widened pupils
A	✓	✓	✓	✓
B	✗	✓	✓	✓
C	✗	✗	✓	✓
D	✓	✗	✗	✗

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12 Light shines on a shoot tip from the direction shown.



After three days, the shoot tip has bent towards the light.

What is the reason for this change?

A Auxin moves away from the light causing cell elongation in area Y.

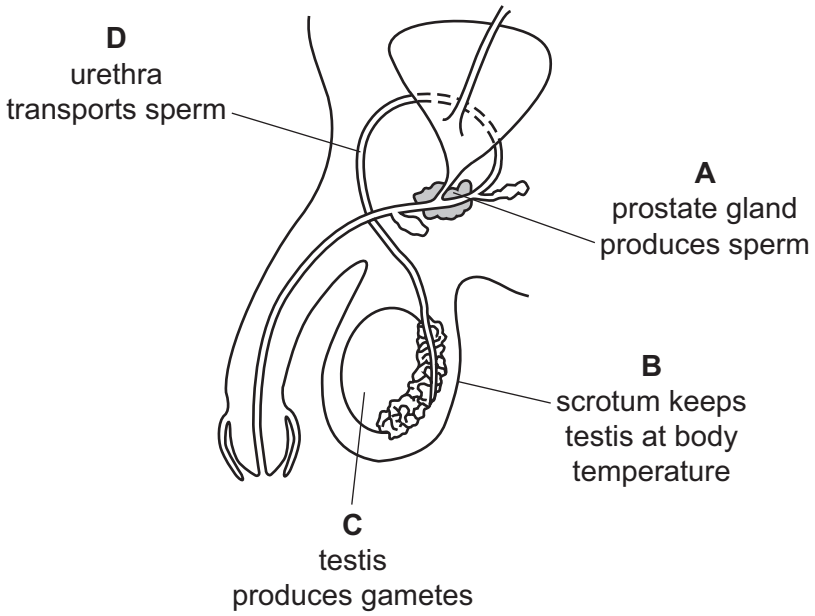
B Auxin moves away from the light preventing cell elongation in area Y.

C Auxin moves towards the light causing cell elongation in area X.

D Auxin moves towards the light preventing cell elongation in area X.

13 The diagram shows the human male reproductive system.

Which label is correct?



14 A sodium atom is represented by $^{23}_{11}Na$.

Which row shows the number of electrons, protons and neutrons in this atom?

	electrons	protons	neutrons
A	10	11	12
B	11	11	12
C	11	12	11
D	12	12	23

15 Which dot-and-cross diagram represents the bonding in a molecule of nitrogen?

A



B



C



D



16 Dilute hydrochloric acid reacts with aqueous sodium carbonate to form sodium chloride, carbon dioxide and water.

What is the ionic equation for this reaction?

A $CO_3^{2-}(aq) + 2H^+(aq) \rightarrow CO_2(g) + H_2O(l)$

B $CO_3^{2-}(aq) + 2Na^+(aq) + 2H^+(aq) + 2Cl^-(aq) \rightarrow 2Na^+(aq) + 2Cl^-(aq)$

C $Cl^-(aq) + Na^+(aq) \rightarrow NaCl(aq)$

D $Na_2CO_3(aq) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

17 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

Which statement about this process is correct?

A Chloride ions lose electrons at the cathode.

B Hydrogen ions gain electrons at the cathode.

C Oxide ions lose electrons at the anode.

D Sodium ions gain electrons at the anode.

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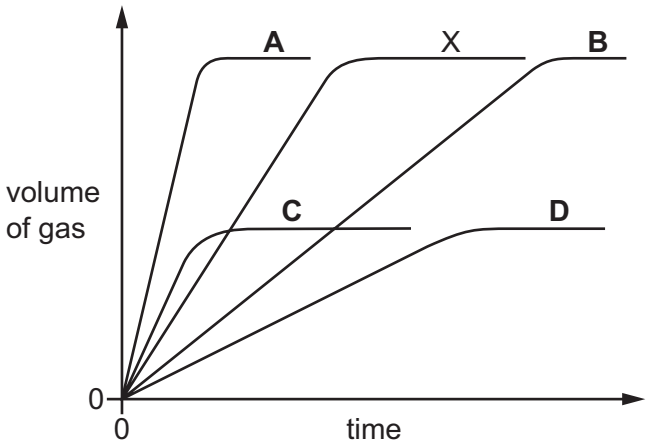
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18 Excess limestone is added to 50 cm^3 1 mol / dm^3 hydrochloric acid.

The volume of gas produced is measured over time.

The results produce line X on the graph.

Which line is produced when excess limestone is added to 50 cm^3 0.5 mol / dm^3 hydrochloric acid at the same temperature?



19 The word equation represents the reaction between substance J and hydrochloric acid.

substance J + hydrochloric acid → magnesium chloride + hydrogen

What is substance J?

A magnesium

B magnesium carbonate

C magnesium hydroxide

D magnesium oxide

20 Which pair of gases can be identified using damp litmus paper and limewater?

A carbon dioxide and hydrogen

B chlorine and carbon dioxide

C chlorine and oxygen

D hydrogen and chlorine

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21 Fluorine is at the top of Group VII in the Periodic Table.

Which statements about fluorine are correct?

1 It is a solid at room temperature.

2 It has a dark colour.

3 It is a very reactive element.

4 It exists as diatomic molecules.

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

22 What are properties of transition elements?

1 They can act as catalysts.

2 They form coloured compounds.

3 They have high densities.

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

23 Iron is extracted from iron ore in a blast furnace.

Which substance is **not** one of the reactants added to the blast furnace?

A carbon

B carbon dioxide

C hematite

D oxygen

24 Which statements about clean air are correct?

1 It consists of 78% nitrogen.

2 It contains a small amount of argon.

3 It contains a small amount of carbon monoxide.

4 It is mostly a compound of nitrogen and oxygen.

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

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25 Petroleum is separated into fractions by fractional distillation.

Which row describes the properties of the molecules in a single fraction?

	boiling points of the molecules	number of carbon atoms in the molecules
A	same	same
B	same	similar
C	similar	same
D	similar	similar

26 The formula of the hydrocarbon octane is C_8H_{18}.

What are the products of the complete combustion of octane?

A carbon and hydrogen

B carbon and water

C carbon dioxide and water

D carbon monoxide and water

27 Which process is an example of thermal decomposition?

A cracking an alkane

B electrolysis of molten lead(II) bromide

C extraction of iron in the blast furnace

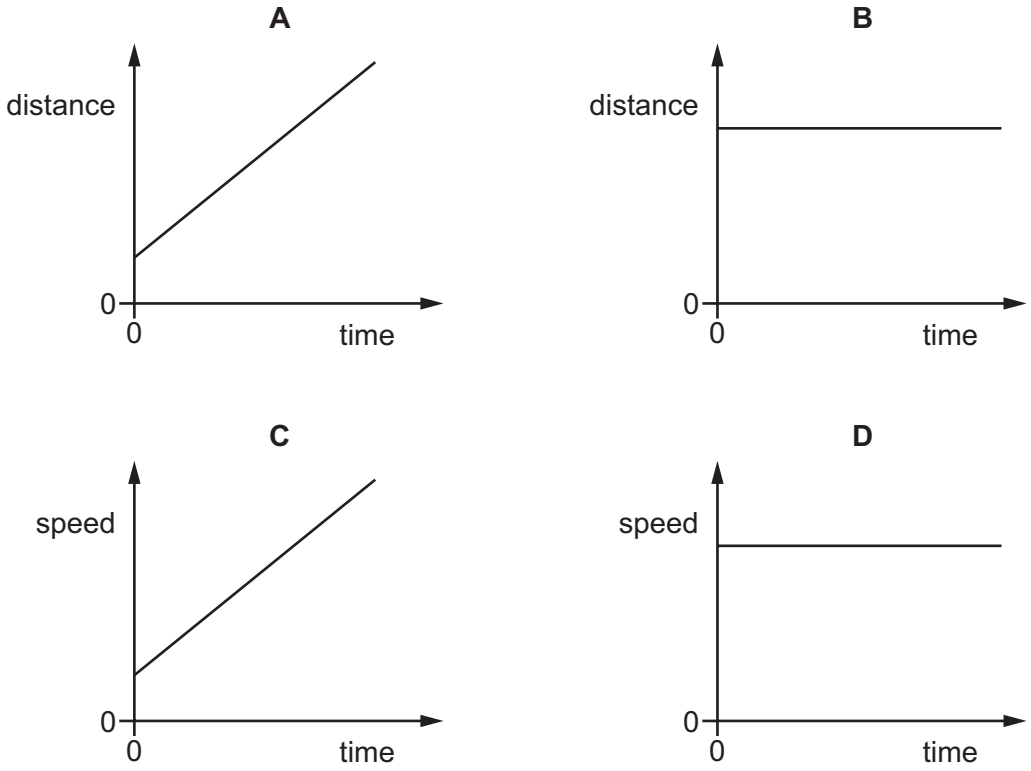
D fractional distillation of petroleum

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28 The diagrams show two distance–time graphs and two speed–time graphs.

Which graph represents the motion of an object that is moving with a constant acceleration that is greater than zero?



29 A man has a mass of 76 kg and an average density of 950 kg / m^3.

The man steps into a bath that is completely full of water. Water spills over the edge of the bath as the man lies down slowly and becomes completely submerged.

What is the volume of water that spills over the edge of the bath?

A 0.072 m^3 **B** 0.080 m^3 **C** 12.5 m^3 **D** 72.2 m^3

30 An aircraft is flying forwards at a steady speed in a straight line.

Which statement about the resultant force on the aircraft is correct?

A The resultant force is a backwards force caused by air resistance.

B The resultant force is a forwards force caused by the engines.

C The resultant force is a downwards force caused by the weight of the aircraft.

D The resultant force is zero because all the forces on the aircraft cancel.

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31 A piece of scientific equipment is taken from the Earth to a distant planet.

Which row describes the properties of the equipment on the distant planet?

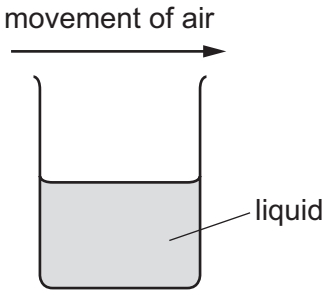
	mass	weight
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = the same as on Earth

✗ = different on each planet

32 A liquid in a beaker evaporates as air moves over it.



Which change increases the rate of evaporation?

A decreasing the speed of the air over the beaker

B decreasing the temperature of the liquid in the beaker

C increasing the quantity of liquid in the beaker

D increasing the width of the beaker

33 A hot object is placed in a vacuum. It loses thermal energy by radiation.

What is this radiation?

A infrared waves

B microwaves

C ultraviolet waves

D X-rays

34 The crests of a wave on the sea reach the beach at a rate of 6.0 crests every 60 seconds. The distance between one crest and the next is 20 m.

What is the speed of the wave?

A 0.30 m / s **B** 2.0 m / s **C** 120 m / s **D** 200 m / s

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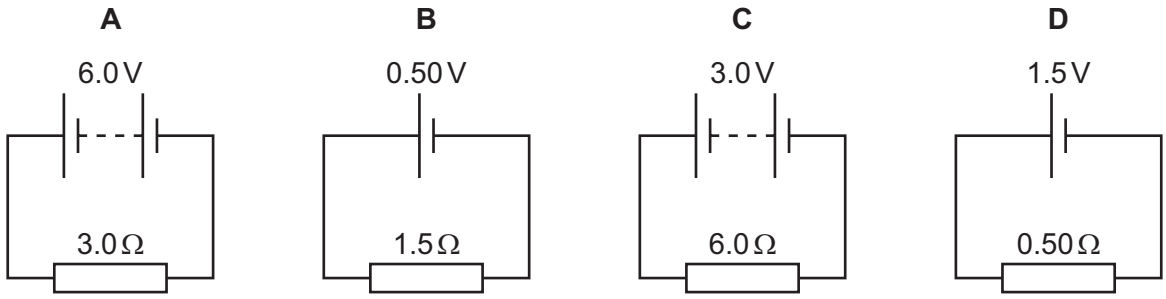
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35 Sound travels at different speeds in different substances.

What are possible values for the speed of sound in air, in water and in steel?

	speed in air / m/s	speed in water / m/s	speed in steel / m/s
A	330	6000	1500
B	330	1500	6000
C	6000	1500	330
D	6000	330	1500

36 In which circuit is there a current of 2.0 A?



37 The resistance of a wire depends on its length and on its diameter.

Which row shows two changes that **both** increase the resistance of the wire?

	change to length	change to diameter
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

38 A resistor of resistance 30 Ω and a resistor of resistance 60 Ω are connected in parallel.

What is their combined resistance?

A 0.050 Ω **B** 20 Ω **C** 45 Ω **D** 90 Ω

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39 A 20 V power supply provides a current of 5.0 A for 1.0 minute.

How much energy does the power supply transfer?

A 4.0 J **B** 100 J **C** 240 J **D** 6000 J

40 Why is the electricity supply to a mains circuit fitted with a fuse?

A to increase the current in the circuit

B to increase the resistance of the circuit

C to maintain a constant current in the circuit

D to prevent overheating of the cables in the circuit

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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 –		114 Fl flerovium –		116 Lv livermorium –		

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.).

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