Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/23**

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

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1 Which row correctly identifies the function of a ciliated cell in the bronchus of a healthy human?

	substance being moved	direction of movement
A	air	towards bronchioles
B	air	towards trachea
C	mucus	towards bronchioles
D	mucus	towards trachea

2 Water enters a plant cell.

In which order does the water pass through the cell structures before reaching the vacuole?

A cell membrane → cell wall → cytoplasm

B cell wall → cell membrane → cytoplasm

C cell wall → cytoplasm → cell membrane

D cytoplasm → cell wall → cell membrane

3 Which row describes an enzyme?

	molecule	function
A	carbohydrate	biological catalyst
B	carbohydrate	hormone
C	protein	biological catalyst
D	protein	hormone

4 What is a symptom of iron deficiency?

A constipation

B feeling tired

C coronary heart disease

D scurvy

5 Chemical digestion produces small, soluble molecules.

For which process is chemical digestion necessary?

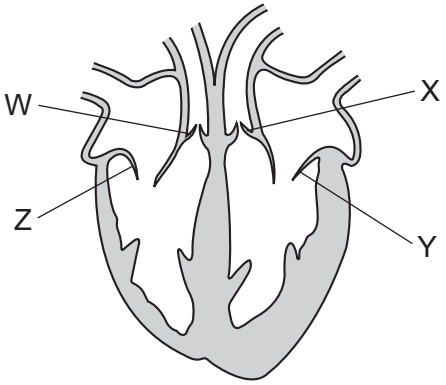
A absorption

B egestion

C excretion

D ingestion

6 The diagram shows a section through the human heart. The four valves are labelled W, X, Y and Z.



When the left ventricle contracts, valve Y closes.

Which row shows the position of the other valves when valve Y is closed?

	valve W	valve X	valve Z
A	closed	closed	closed
B	open	closed	open
C	open	open	closed
D	open	open	open

7 Which row describes how the oxygen concentration and carbon dioxide concentration in blood changes as the blood passes through the lungs?

	oxygen concentration	carbon dioxide concentration
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

8 The incomplete equation for aerobic respiration is shown.

$$X + \text{oxygen} \rightarrow \text{carbon dioxide} + \text{water}$$

What is the formula of X?

A $C_6H_6O_{12}$ **B** $C_6H_{12}O_6$ **C** $C_{12}H_{12}O_6$ **D** $6CH_{12}O_6$

9 Which row is correct for auxin in a shoot?

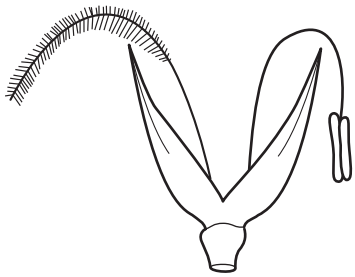
	effect of auxin	side of shoot where more auxin is found
A	cell division	closer to the light
B	cell division	further away from the light
C	cell elongation	closer to the light
D	cell elongation	further away from the light

10 Which row is correct for sexual reproduction?

	requires gametes	offspring produced
A	yes	genetically different
B	yes	genetically identical
C	no	genetically different
D	no	genetically identical

11 Which diagram shows the stigma and stamen of a wind-pollinated flower?

A



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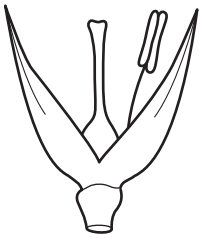

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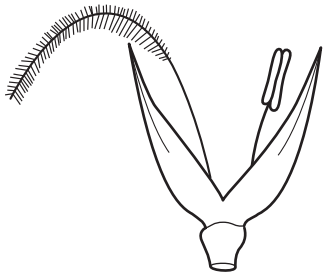

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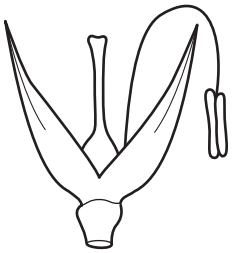


12 What is the function of the placenta?

A to allow the mixing of the mother's blood with the blood of the fetus

B to exchange nutrients and waste

C to keep the fetus warm

D to stop the fetus from moving

13 What are the effects of deforestation and the combustion of fossil fuels on the concentrations of carbon dioxide and oxygen in the atmosphere?

	concentration of carbon dioxide	concentration of oxygen
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

[Turn over

14 Solid mixtures X and Y are made from the salts as shown in the table.

mixture X	mixture Y
barium sulfate: white, insoluble iron(III) sulfate: brown, soluble	potassium chromate(VI): yellow, soluble potassium manganate(VII): purple, soluble

Each mixture is shaken with water.

How can the salts in each mixture be separated?

	mixture X	mixture Y
A	chromatography	chromatography
B	chromatography	filtration
C	filtration	chromatography
D	filtration	filtration

15 Which particle has the smallest mass?

A atom

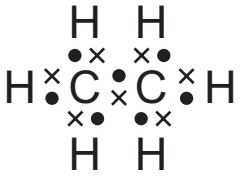
B electron

C neutron

D proton

16 Which dot-and-cross diagram represents the bonding in a molecule of ethene?

A



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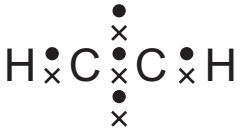

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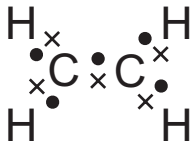

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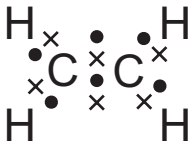


17 What are the correct numbers of atoms in one molecule of nitric acid?

	hydrogen	nitrogen	oxygen
A	1	1	3
B	1	3	1
C	2	1	3
D	2	3	1

18 Molten silver chloride is electrolysed using inert electrodes.

Which statement about this electrolysis is correct?

A Silver ions gain electrons at the anode.

B Silver ions gain electrons at the cathode.

C Silver ions lose electrons at the anode.

D Silver ions lose electrons at the cathode.

19 The reaction of bromine with ethene is exothermic.

Which statement about this reaction is correct?

A The activation energy is greater than the energy released in bond formation.

B The activation energy must be less than the overall energy change.

C The energy gained in bond forming causes the temperature to fall.

D The energy released in bond forming is greater than the energy used in bond breaking.

20 Which row describes what happens to the rate of reaction and the frequency of collisions between particles when the concentration of a reactant is increased?

	rate of reaction	frequency of collisions
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

21 Which statements about an oxidising agent are correct?

1 It is oxidised in a redox reaction.

2 It is reduced in a redox reaction.

3 It oxidises another substance in a redox reaction.

4 It reduces the reducing agent in a redox reaction.

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

22 Magnesium chloride crystals can be made by reacting solid magnesium carbonate with dilute hydrochloric acid.

What is **not** used in this process?

A excess solid

B crystallisation

C distillation

D filtration

23 Which statement about the halogens is correct?

A Aqueous sodium bromide reacts with chlorine to produce aqueous sodium chloride.

B Aqueous sodium chloride reacts with iodine to produce aqueous sodium iodide.

C Bromine reacts with aqueous sodium chloride to produce chlorine.

D Iodine reacts with aqueous sodium bromide to produce bromine.

24 Which metal is extracted from bauxite?

A aluminium

B copper

C iron

D zinc

25 Two different bottles each contain a colourless liquid.

One bottle contains an alkene and the other contains water.

Three different tests are listed.

1 addition of pink cobalt(II) chloride

2 addition of brown aqueous bromine

3 addition of white copper(II) sulfate

Which tests can be used to positively identify the bottle that contains water?

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

26 Which statement about greenhouse gases is correct?

A Increased concentrations of greenhouse gases cause a reduced greenhouse effect, which may contribute to climate change.

B Increased concentrations of greenhouse gases cause an enhanced greenhouse effect, which may contribute to climate change.

C Increased concentrations of greenhouse gases cause an enhanced greenhouse effect, which does **not** contribute to climate change.

D Decreased concentrations of greenhouse gases cause an enhanced greenhouse effect, which may contribute to climate change.

27 Q, R and S are fossil fuels.

The main constituent of Q is methane.

R is a source of diesel oil and bitumen.

S is burned in car engines.

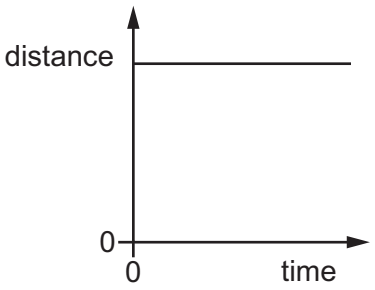
Which row identifies Q, R and S?

	Q	R	S
A	natural gas	gasoline	petroleum
B	natural gas	petroleum	gasoline
C	coal	gasoline	petroleum
D	coal	petroleum	gasoline

[Turn over

28 Which distance–time graph represents an object that is moving with changing speed?

A



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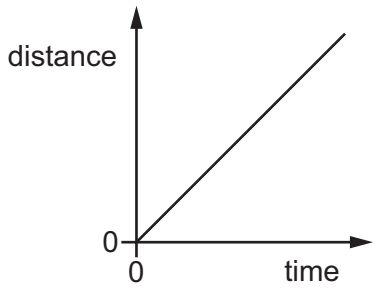

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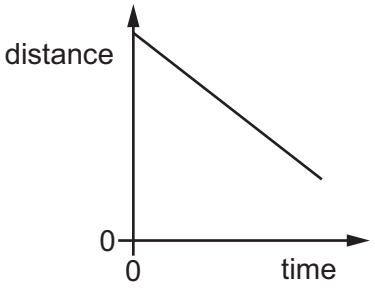

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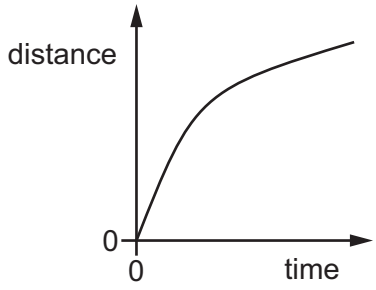


29 Which statement about mass and weight is correct?

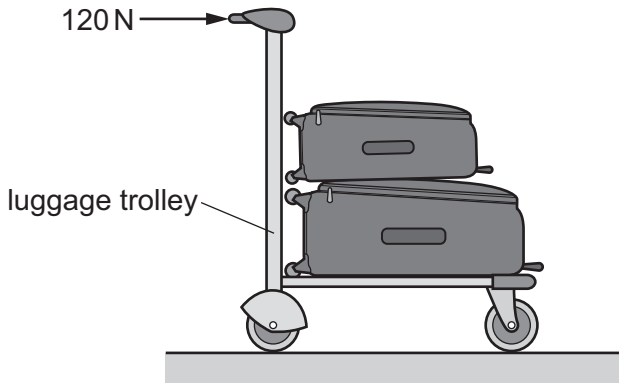
A Mass is the gravitational field that acts on a weight.

B Mass is the gravitational force that acts on a weight.

C Weight is the gravitational field that acts on a mass.

D Weight is the gravitational force that acts on a mass.

30 A luggage trolley is pushed with a horizontal force of 120 N.



The trolley travels a distance of 500 cm in the direction of the force.

How much work is done?

A 24 J **B** 60 J **C** 600 J **D** 60 000 J

31 A brick of mass 3.0 kg rests on a shelf. The brick falls from the shelf. The brick hits the ground at a speed of 8.0 m / s.

Ignore air resistance.

How much kinetic energy does the brick have just before hitting the ground, and how much gravitational potential energy does the brick have when on the shelf?

	kinetic energy before hitting ground / J	gravitational potential energy on shelf / J
A	24	24
B	24	96
C	96	0
D	96	96

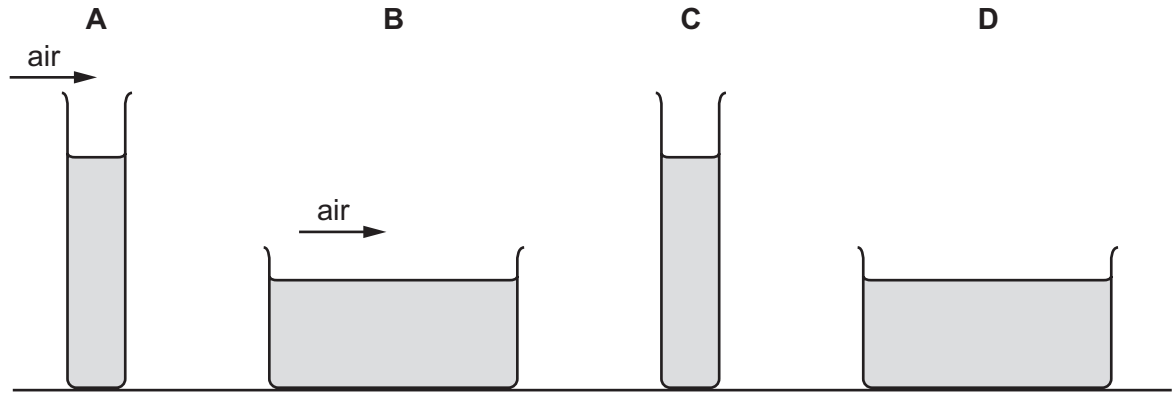
32 Which row states an advantage and a disadvantage of the energy resource given?

	energy resource	advantage	disadvantage
A	natural gas	renewable	produces carbon dioxide
B	nuclear fission	no hazardous waste	expensive to build a power station
C	solar energy	does not produce carbon dioxide	not always available
D	wind energy	cheap to run	non-renewable

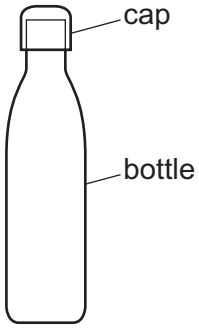
33 The water in four containers is at the same temperature.

There is a movement of air over the surface of containers **A** and **B** but **not** over **C** and **D**.

From which container does the water evaporate at the lowest rate?



34 An aluminium cap is screwed onto the top of an aluminium bottle.



The cap is difficult to unscrew.

Which action makes removing the cap easier?

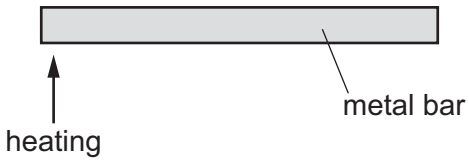
A cooling only the cap in cold water

B heating only the bottle in hot water

C placing both the bottle and the cap in a freezer

D placing both the bottle and the cap in a hot oven

35 A metal bar is heated at one end.



What is the main method by which thermal energy reaches the other end of the bar?

A Electrons at the heated end gain kinetic energy and move along the bar.

B Electrons at the heated end move apart and set up a convection current along the bar.

C Molecules at the heated end gain kinetic energy and move along the bar.

D Molecules at the heated end move apart and set up a convection current along the bar.

36 Three types of wave are listed.

1 microwaves

2 sound waves

3 radio waves

Which waves are longitudinal waves?

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

37 A wave is refracted when it moves from one medium to another.

What **must** remain constant?

A direction of motion

B frequency

C speed

D wavelength

38 The current in a resistor is 4.0 A.

What is the time taken for 1200 C of charge to flow through the resistor?

A 0.20 min **B** 5.0 min **C** 80 min **D** 300 min

39 A student connects a lamp to a cell.

Which change to the circuit can increase the current in the circuit?

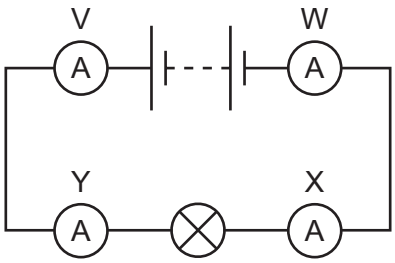
A connecting a second cell in series

B connecting a second lamp in series

C connecting a variable resistor in series

D connecting an ammeter in series

40 Four ammeters, V, W, X and Y, are connected in the circuit shown.



Which ammeters have the same reading as each other?

A V, W, X and Y

B V and W only

C V and Y only

D X and Y only

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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.).