



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.

This document has **16** pages. Any blank pages are indicated.

- 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?

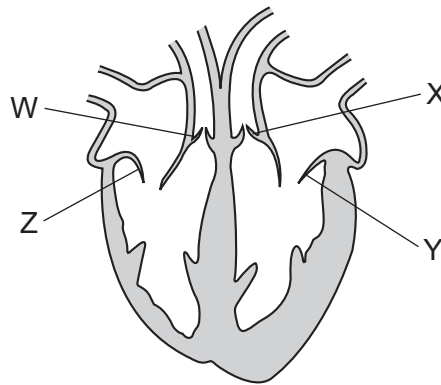
- A** constipation
B feeling tired
C coronary heart disease
D scurvy

- 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.



What is the formula of X?

- A** $\text{C}_6\text{H}_6\text{O}_{12}$ **B** $\text{C}_6\text{H}_{12}\text{O}_6$ **C** $\text{C}_{12}\text{H}_{12}\text{O}_6$ **D** $6\text{CH}_{12}\text{O}_6$

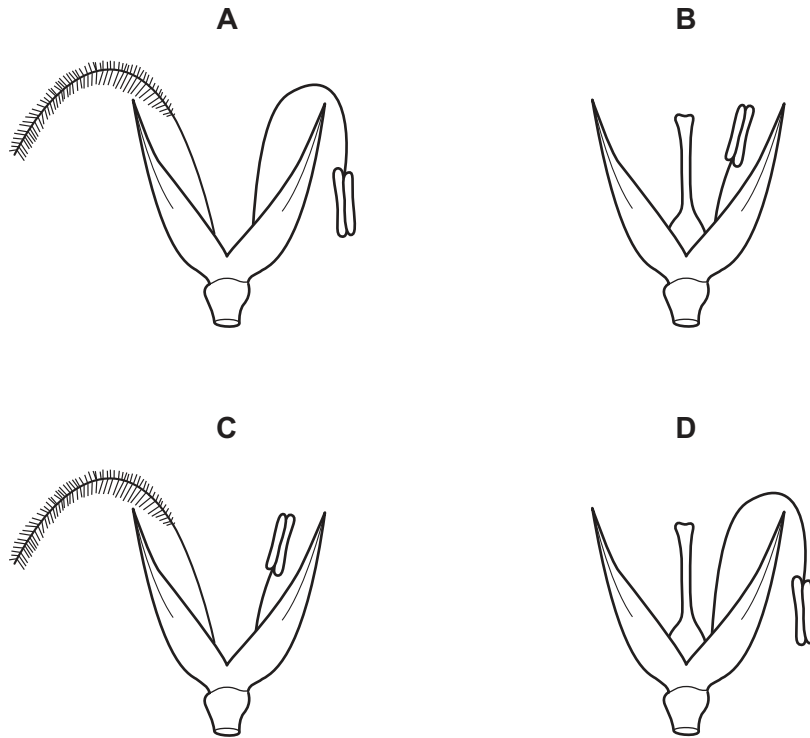
- 9 Which row is correct for auxin in a shoot?

	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?



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

- 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.

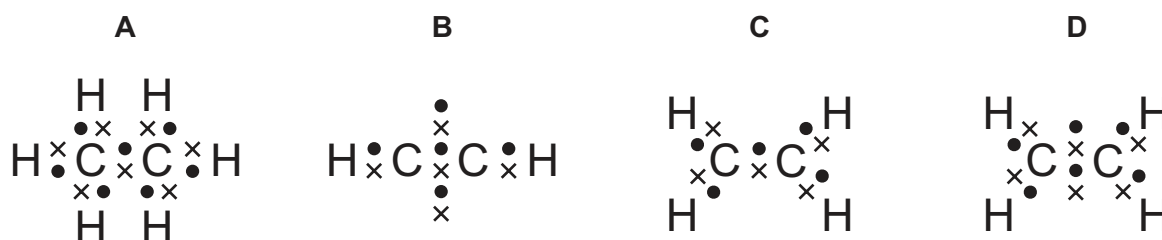
How can the salts in each mixture be separated?

	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?



- 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.

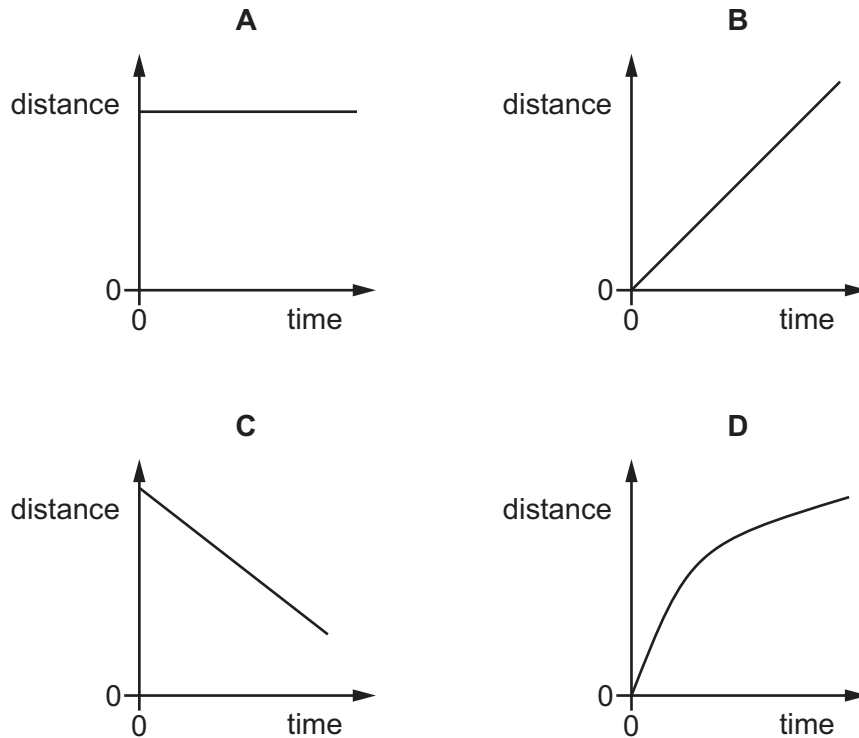
R is a source of diesel oil and bitumen.

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

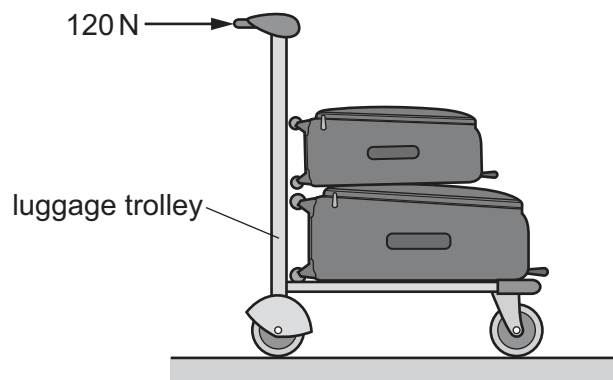
28 Which distance–time graph represents an object that is moving with changing speed?



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

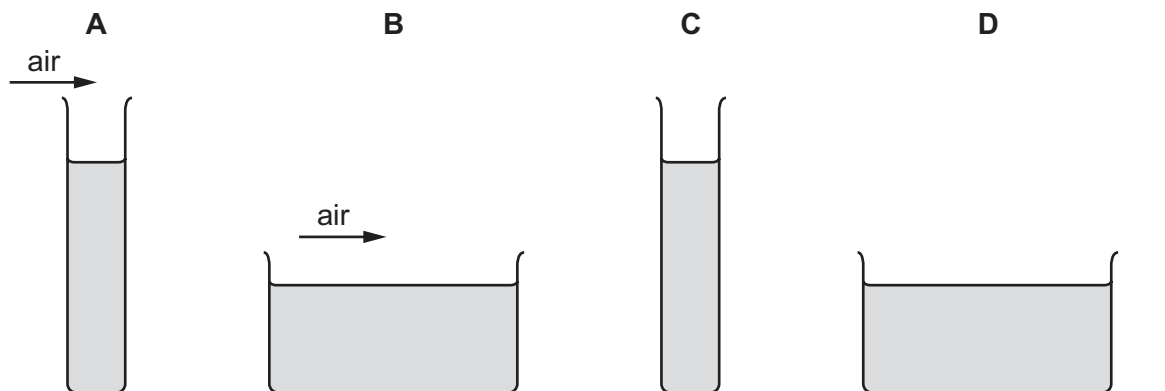
- 32** Which row states an advantage and a disadvantage of the energy resource given?

	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.

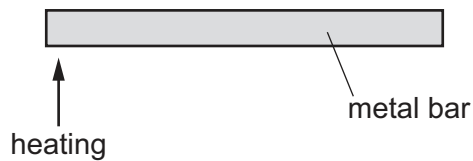


The cap is difficult to unscrew.

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?

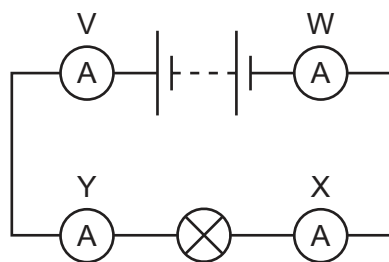
- A 0.20 min B 5.0 min C 80 min D 300 min

- 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	1 H hydrogen 1										III	IV	V	VI	VII	VIII	

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
	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.).