



# Cambridge IGCSE™

**CO-ORDINATED SCIENCES**

**0654/12**

Paper 1 Multiple Choice (Core)

**May/June 2020**

**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. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Blank pages are indicated.



- 1 Which characteristic of living things is described as the removal of toxic materials and substances in excess of requirements?
- A excretion
  - B homeostasis
  - C nutrition
  - D respiration

- 2 What is **not** in contact with cytoplasm?

- A cellulose cell wall
- B cell membrane
- C chloroplast
- D nucleus

- 3 A food contains reducing sugar, but no starch.

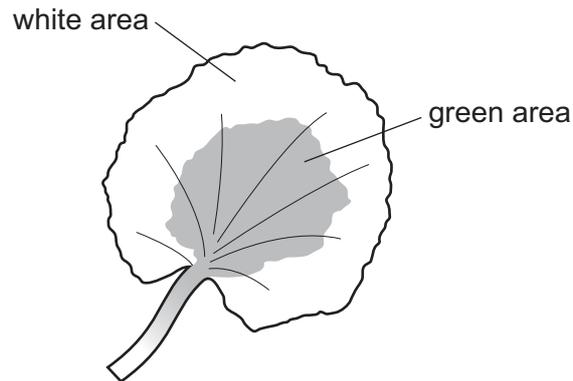
What colours will be obtained if samples of the food are tested with Benedict's solution and with iodine solution?

	Benedict's test	iodine test
<b>A</b>	blue	blue-black
<b>B</b>	blue	brown
<b>C</b>	red-orange	blue-black
<b>D</b>	red-orange	brown

- 4 Which smaller molecules make up enzymes?

- A amino acids
- B fatty acids
- C glucose
- D glycerol

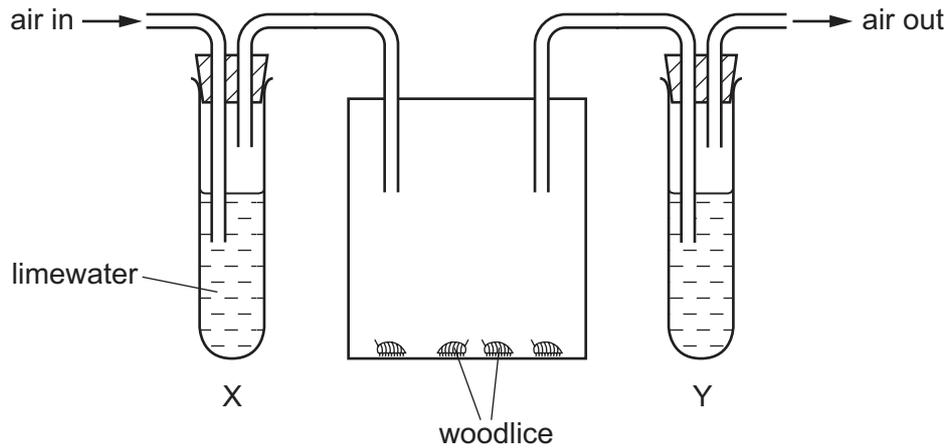
5 The diagram shows a variegated leaf.



Which requirement for photosynthesis can be tested using this leaf but **not** a completely green leaf?

- A carbon dioxide
  - B chlorophyll
  - C light
  - D water
- 6 Why is calcium needed in the diet?
- A to make carbohydrates
  - B to make teeth
  - C to make enzymes
  - D to make protein
- 7 What pathway is taken by water molecules as they move through a plant?
- A mesophyll cells → xylem vessels → root cortex cells
  - B root cortex cells → mesophyll cells → xylem vessels
  - C root cortex cells → xylem vessels → mesophyll cells
  - D xylem vessels → root cortex cells → mesophyll cells

- 8 Some students investigated aerobic respiration in woodlice. They set up the apparatus as shown.



After 1 hour they recorded the appearance of the limewater in X and Y.

Which row is correct for the appearance of X and Y?

	X	Y
<b>A</b>	milky	milky
<b>B</b>	milky	clear
<b>C</b>	clear	milky
<b>D</b>	clear	clear

- 9 What is the definition of homeostasis?

- A** controlling body temperature
- B** controlling responses to stimuli
- C** maintaining a constant external environment
- D** maintaining a constant internal environment

- 10 Which statement correctly describes sexual reproduction?

- A** fusion of gametes from two parents with genetic variation in the offspring
- B** fusion of gametes from two parents with no genetic variation in the offspring
- C** no fusion of gametes and only one parent with genetic variation in the offspring
- D** no fusion of gametes and only one parent with no genetic variation in the offspring

11 A farmer wants to breed sheep that will produce a high yield of milk.

What is required for breeding these sheep?

	genetic variation	selective breeding	natural selection	
<b>A</b>	✓	✓	x	key ✓ = yes x = no
<b>B</b>	✓	x	✓	
<b>C</b>	x	✓	x	
<b>D</b>	x	x	✓	

12 Which organism gets its energy from dead or waste organic matter?

- A carnivore
- B decomposer
- C herbivore
- D omnivore

13 What could deforestation cause?

- A a decrease in carbon dioxide levels and a decrease in flooding
- B a decrease in carbon dioxide levels and an increase in flooding
- C an increase in carbon dioxide levels and a decrease in flooding
- D an increase in carbon dioxide levels and an increase in flooding

14 Which statement about atoms and molecules is correct?

- A All molecules are gases at room temperature and pressure.
- B An atom is the smallest part of an element.
- C Atoms of the same element all have the same mass.
- D Molecules always contain atoms of more than one element.

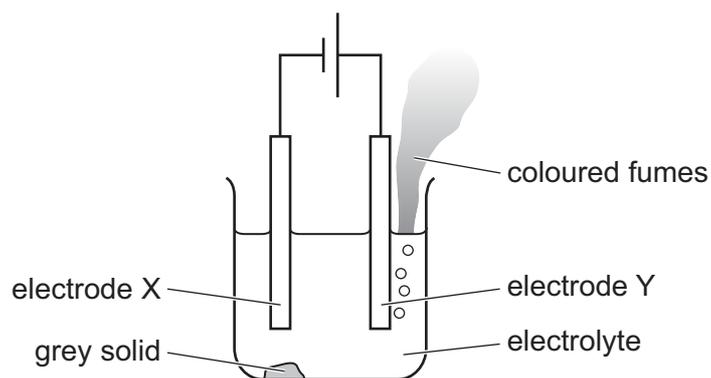
15 Which row shows the particles in the nucleus of an atom of  $^{25}_{12}\text{Mg}$ ?

	protons	neutrons
<b>A</b>	12	12
<b>B</b>	12	13
<b>C</b>	13	12
<b>D</b>	13	13

16 What is a property of a typical covalent compound?

- A electrical insulator
- B high melting point
- C low volatility
- D soluble in water

17 The diagram shows the electrolysis of lead(II) bromide using inert electrodes.



Which statement about this experiment is correct?

- A Electrode X is positively charged.
- B The coloured fumes are produced at the negative electrode.
- C The electrolyte is lead(II) bromide.
- D The grey solid is lead(II) bromide.

- 18 Equal amounts of four different substances are added to equal volumes of the same acid of the same concentration in reactions W, X, Y and Z.

The initial temperature of the acid before each reaction is 21 °C.

The final temperatures of the mixtures are measured.

The results are shown.

reaction	W	X	Y	Z
final temperature / °C	28	19	26	17

Which row is correct?

	most endothermic reaction	most exothermic reaction
<b>A</b>	W	Z
<b>B</b>	Z	W
<b>C</b>	X	Y
<b>D</b>	Y	X

- 19 Which reaction involves both oxidation and reduction?

- A** calcium carbonate → calcium oxide + carbon dioxide  
**B** copper oxide + carbon → copper + carbon dioxide  
**C** silver nitrate + potassium chloride → silver chloride + potassium nitrate  
**D** sulfuric acid + sodium hydroxide → sodium sulfate + water

- 20 Zinc oxide is an insoluble base.

It reacts with dilute hydrochloric acid to produce zinc chloride.

Zinc chloride is soluble in water.

Which statement about the preparation of zinc chloride crystals is correct?

- A** Once the reaction is complete there is no need to filter the reaction mixture.  
**B** The reaction mixture is neutral at the point that no more zinc oxide reacts.  
**C** Zinc chloride crystals are obtained by evaporation to dryness.  
**D** Zinc chloride precipitates when the solution becomes neutral.

- 21 Which test is used to identify sulfate ions?
- A aqueous barium ions under acidic conditions
  - B aqueous silver nitrate under acidic conditions
  - C dilute acid and then limewater
  - D reduction with aluminium
- 22 Which statement about the halogens is **not** correct?
- A They are members of Group VII of the Periodic Table.
  - B They are non-metals.
  - C They become darker in colour down the group.
  - D They exist as monoatomic gases.
- 23 Which statement is **not** a reason why aluminium is used in aircraft manufacture?
- A It forms low density alloys.
  - B It is malleable.
  - C It is more reactive than iron.
  - D It is resistant to corrosion.
- 24 Which statement about fertilisers is correct?
- A They are fed to animals to improve the animals' growth.
  - B They contain only nitrogen, phosphorus and potassium as elements.
  - C They increase plant growth by adding chemicals directly to plant flowers.
  - D They increase plant growth by adding chemicals to the soil.
- 25 Which statement about calcium carbonate is **not** correct?
- A It forms carbon dioxide when it is heated.
  - B It forms carbon dioxide when it is mixed with dilute hydrochloric acid.
  - C It is formed by heating lime.
  - D It neutralises acids.

26 Which row describes properties of alkenes?

	structure of molecules	products of complete combustion
<b>A</b>	contain only carbon and hydrogen	CO <sub>2</sub> and H <sub>2</sub> O
<b>B</b>	contain only carbon and hydrogen	CO and H <sub>2</sub> O
<b>C</b>	contain only single bonds	CO and H <sub>2</sub> O
<b>D</b>	contain only single bonds	CO <sub>2</sub> and H <sub>2</sub> O

27 Which statement about the manufacture of polymers is correct?

- A** Polymers are made by breaking long-chain molecules into shorter chain ones.
- B** Polymers are made by joining polymers together.
- C** Polymers are made by fractional distillation of petroleum.
- D** Polymers are made by joining short-chain molecules together.

28 On Earth the gravitational field strength  $g$  is 10 N/kg.

What is the mass of an object that weighs 150 N on Earth?

- A** 1.5 kg      **B** 15 kg      **C** 150 kg      **D** 1500 kg

29 A metal has a density of 20 g/cm<sup>3</sup>.

A bar made of this metal has a volume of 50 cm<sup>3</sup>.

What is the mass of the bar?

- A** 0.40 g      **B** 2.5 g      **C** 70 g      **D** 1000 g

30 Two different forces act on two different areas.

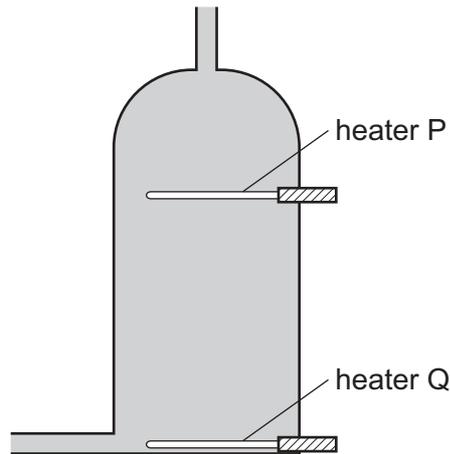
Which combination of force and area produces the greatest pressure?

- A** the larger force acting on the larger area
- B** the larger force acting on the smaller area
- C** the smaller force acting on the larger area
- D** the smaller force acting on the smaller area

31 Which source of energy is renewable?

- A coal
- B geothermal
- C natural gas
- D nuclear

32 A hot water tank is fitted with two identical heaters P and Q. Heater P is fitted above heater Q as shown. The tank is full of cold water.



When only heater Q is switched on, it takes a long time to heat the tank of water to  $60^{\circ}\text{C}$ .

What happens to the cold water when only heater P is switched on?

- A All the water reaches  $60^{\circ}\text{C}$  in less time.
  - B All the water reaches  $60^{\circ}\text{C}$  in the same time.
  - C The water below heater P reaches  $60^{\circ}\text{C}$  in less time.
  - D The water above heater P reaches  $60^{\circ}\text{C}$  in less time.
- 33 'The maximum distance a particle on the surface of deep water moves from its rest position when a wave passes it.'
- Which property of a wave does this describe?
- A amplitude
  - B frequency
  - C speed
  - D wavelength

- 34 The sound heard from the siren of a police car becomes louder and higher pitched as the car approaches an observer.

What happens to the amplitude and what happens to the frequency of the sound wave heard by the observer?

	amplitude	frequency
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

- 35 Radio waves and X-rays have different wavelengths. One of these two types of wave is ionising radiation.

Which row shows the type of wave with the smaller wavelength and the type of wave that is ionising radiation?

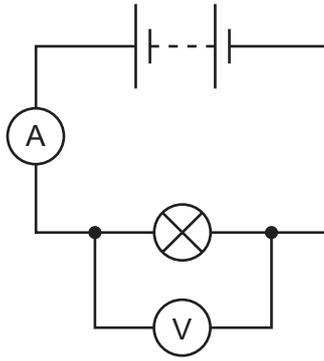
	smaller wavelength	ionising radiation
<b>A</b>	radio waves	radio waves
<b>B</b>	radio waves	X-rays
<b>C</b>	X-rays	radio waves
<b>D</b>	X-rays	X-rays

- 36 Two rods made of different insulators are charged by friction using a cloth. One rod becomes negatively charged and the other rod becomes positively charged.

What happens during the charging process?

	positively charged rod	negatively charged rod
<b>A</b>	gains electrons	gains protons
<b>B</b>	gains protons	loses protons
<b>C</b>	loses electrons	gains electrons
<b>D</b>	loses electrons	gains protons

37 The circuit shown is used when determining the resistance of a lamp.



The ammeter reading is 2.0 A and the voltmeter reading is 6.0 V.

What is the resistance of the lamp?

- A** 0.33  $\Omega$       **B** 3.0  $\Omega$       **C** 8.0  $\Omega$       **D** 12  $\Omega$

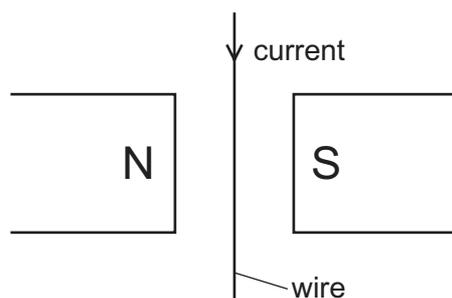
38 A fuse is a safety device for use in an electrical circuit.

The current in the circuit becomes greater than the rated value for the fuse.

What happens?

- A** The current decreases to zero.  
**B** The current decreases to the rated value for the fuse.  
**C** The thickness of the insulation around the wires increases.  
**D** The current is sent to the outer case of the appliance.

- 39 The diagram shows a wire in a magnetic field. There is a current in the wire. This causes a force on the wire.

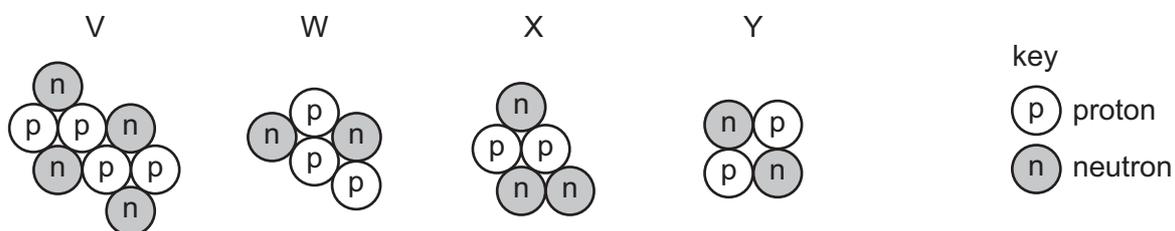


The current is now doubled and the direction of the magnetic field is reversed.

What happens to the force?

	magnitude of force	direction of force
<b>A</b>	decreases	changes
<b>B</b>	decreases	does not change
<b>C</b>	increases	changes
<b>D</b>	increases	does not change

- 40 The diagrams represent the nuclei of four different atoms V, W, X and Y.



Which two diagrams represent isotopes of the same element?

- A** V and Y      **B** W and X      **C** X and Y      **D** Y and W



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The Periodic Table of Elements

		Group																				
I	II	III	IV	V	VI	VII	VIII															
3 Li lithium 7	4 Be beryllium 9	11 Na sodium 23	12 Mg magnesium 24	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	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 Ac actinium —	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 —								
		<b>Key</b> atomic number atomic symbol name relative atomic mass		1 H hydrogen 1																		

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<sup>3</sup> at room temperature and pressure (r.t.p.).