



Cambridge IGCSE™

COMBINED SCIENCE**0653/22**

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.

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



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 Food tests are carried out on a biscuit.

The results of the food tests are shown.

test for	colour observed
fat	white emulsion
protein	blue
reducing sugar	orange
starch	blue-black

Which biological molecules are present in the biscuit?

	fat	protein	reducing sugar	starch
A	✓	x	x	x
B	✓	x	✓	✓
C	x	✓	✓	✓
D	x	✓	x	x

4 Which substance in leaves traps light energy for use in photosynthesis?

- A carbohydrate
- B carbon
- C carbon dioxide
- D chlorophyll

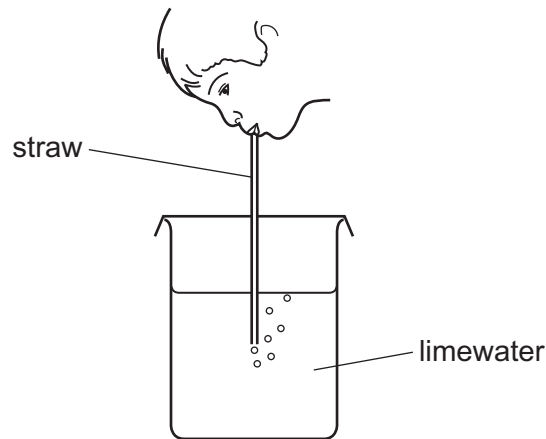
5 Which types of malnutrition could lead to constipation and scurvy?

	constipation	scurvy
A	excess of fibre	lack of vitamin C
B	excess of fibre	lack of vitamin D
C	lack of fibre	lack of vitamin C
D	lack of fibre	lack of vitamin D

6 Where is amylase active in the alimentary canal?

	stomach	small intestine
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 7 A student tests her exhaled breath by blowing through a straw into some limewater.



Which statements are correct about this test?

	colour of limewater at start of test	colour of limewater at end of test	what the test shows
A	colourless	milky white	carbon dioxide is present in the exhaled breath
B	colourless	milky white	water vapour is present in the exhaled breath
C	milky white	colourless	carbon dioxide is present in the exhaled breath
D	milky white	colourless	water vapour is present in the exhaled breath

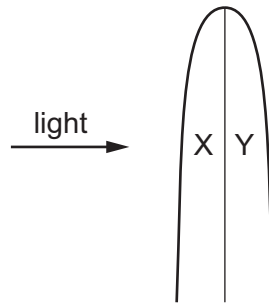
- 8 What is the word equation for aerobic respiration?

- 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

- 9 What are two effects of the secretion of adrenaline on the human body?

- A** decreased blood glucose concentration and decreased pulse rate
B decreased blood glucose concentration and increased pulse rate
C increased blood glucose concentration and decreased pulse rate
D increased blood glucose concentration and increased pulse rate

10 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.

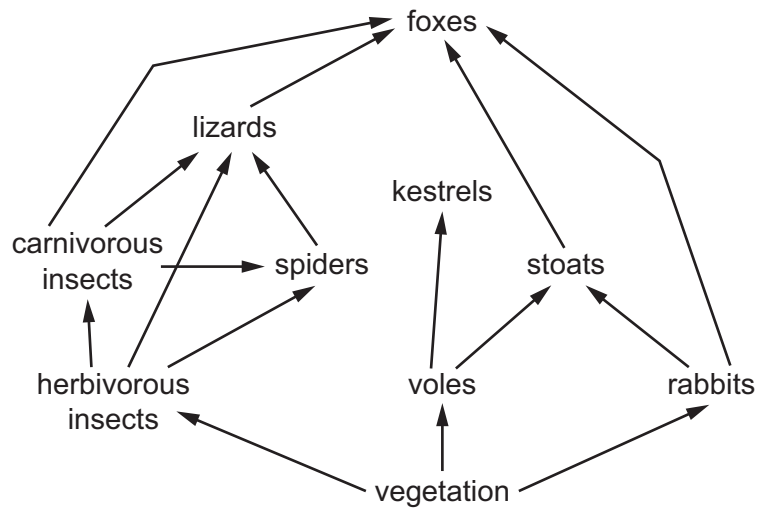
11 What are two features of sexual reproduction?

	feature 1	feature 2
A	fusion of two identical nuclei	requires two different parents
B	fusion of two zygotes	offspring are genetically identical
C	offspring are genetically different	fusion of two different nuclei
D	only requires a single parent	development from a single zygote

12 Which row is correct for the female gamete?

	released in large numbers	can move by itself
A	✓	✓
B	✓	x
C	x	✓
D	x	x

13 The diagram shows a food web.



Which organisms in this web are quaternary consumers?

- A carnivorous insects and foxes
- B foxes and lizards
- C kestrels and stoats
- D lizards and stoats

14 An atom of aluminium and an atom of fluorine are represented as shown.



Which statement is **not** correct?

- A The aluminium atom contains four more electrons than the fluorine atom.
- B The aluminium atom contains four more protons than the fluorine atom.
- C The aluminium atom contains eight more neutrons than the fluorine atom.
- D The aluminium atom contains eight more nucleons than the fluorine atom.

- 15 Which row describes and explains the difference in melting points between ionic and covalent compounds?

	melting point	reason
A	ionic compounds have higher melting points	ionic bonds are stronger than covalent bonds
B	ionic compounds have higher melting points	attractive forces between ions are stronger than attractive forces between molecules
C	ionic compounds have lower melting points	ionic bonds are weaker than covalent bonds
D	ionic compounds have lower melting points	attractive forces between ions are weaker than attractive forces between molecules

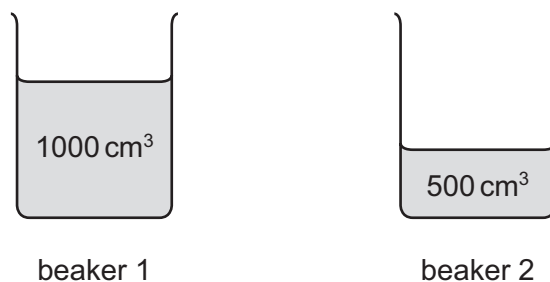
- 16 Potassium phosphate is an ionic compound used in fertilisers.

Phosphate ions have the symbol PO_4^{3-} .

What is the formula for potassium phosphate?

- A** KPO_4 **B** $\text{K}(\text{PO}_4)_3$ **C** K_2PO_4 **D** K_3PO_4
- 17 Which equation represents the process that occurs at the cathode during the electrolysis of concentrated aqueous sodium chloride?
- A** $2\text{O}^{2-} \rightarrow \text{O}_2 + 4\text{e}^-$
- B** $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}^-$
- C** $\text{Na}^+ + \text{e}^- \rightarrow \text{Na}$
- D** $2\text{H}^+ + 2\text{e}^- \rightarrow \text{H}_2$

18 The reaction between two aqueous reactants, P and Q, is carried out in two different beakers.



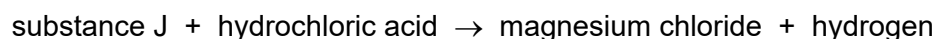
The temperature and the number of particles of P and Q are the **same** in both beakers.

Which statements about the collisions between the reacting particles in the two beakers must be correct?

- 1 The average energy of the collisions is greater in beaker 2.
- 2 The frequency of the collisions is greater in beaker 2.
- 3 The proportion of the collisions that result in a reaction is greater in beaker 2.

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

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



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

- 21 Which statement about the elements in Group VII is correct?
- A Bromine reacts with potassium chloride to make chlorine.
 - B Chlorine is the least reactive element in Group VII.
 - C Chlorine reacts with potassium iodide to make iodine.
 - D Potassium bromide reacts with all of the elements in Group VII.
- 22 Element X has a high density and conducts electricity when solid and when molten.
- Where in the Periodic Table is element X placed?
- A Group 0
 - B Group I
 - C halogens
 - D transition elements
- 23 Which metal **cannot** be extracted from its ore by heating with carbon?
- A Al B Cu C Fe D Zn
- 24 A few drops of liquid X are added to a white solid.
- The white solid turns blue.
- Which statements are correct?
- 1 The white solid is copper(II) sulfate.
 - 2 Liquid X is water.
 - 3 Liquid X turns blue cobalt(II) chloride paper pink.
- A 1 and 2 only B 1 and 3 only C 2 and 3 only D 1, 2 and 3
- 25 Bitumen and gasoline are fractions obtained from petroleum by fractional distillation.
- Which statement explains why the boiling range of the bitumen fraction is higher than the boiling range of the gasoline fraction?
- A It contains smaller molecules.
 - B It leaves the fractional distillation column at the bottom.
 - C Its molecules have greater forces of attraction.
 - D Its molecules have stronger covalent bonds.

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

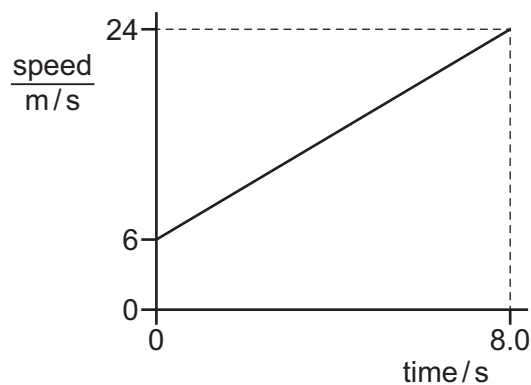
What are the products of the complete combustion of octane?

- 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

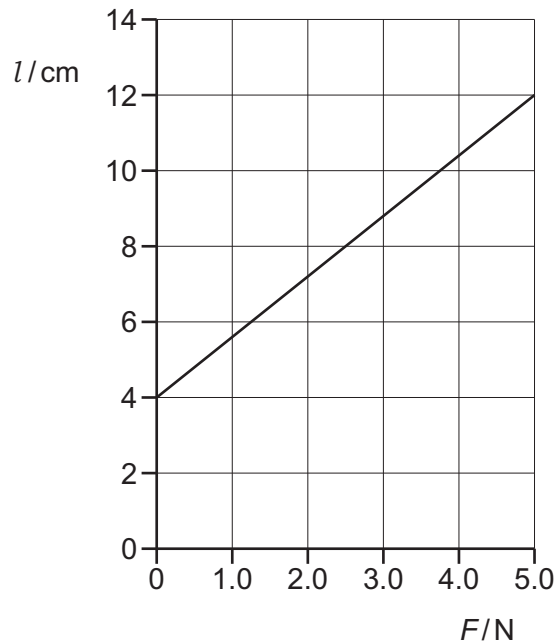
28 The diagram shows a speed–time graph for a car.



What is the distance travelled by the car between time = 0 and time = 8.0 s?

- A 96 m
- B 120 m
- C 144 m
- D 192 m

- 29 A spring is stretched by a force F . The graph shows how the length l of the spring changes with F .



What is the spring constant of the spring?

- A 0.42 N/cm B 0.63 N/cm C 1.6 N/cm D 2.4 N/cm
- 30 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

- 31 Which statement about water is correct?
- A It boils at 0°C and melts at 100°C .
- B It boils at 0°C and melts at -100°C .
- C It boils at 100°C and melts at -100°C .
- D It boils at 100°C and melts at 0°C .

32 The volume of a gas is increased but its temperature remains the same.

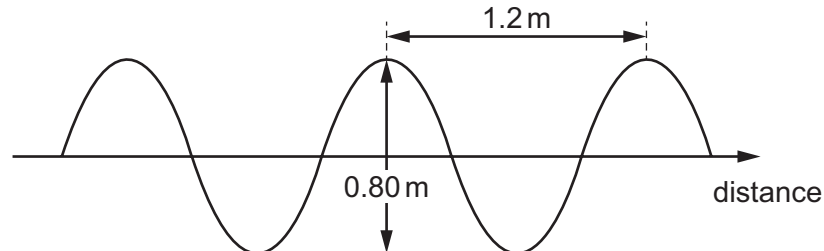
What happens to the molecules of the gas?

- A They move closer together.
- B They move further apart.
- C They move more quickly.
- D They move more slowly.

33 Which row compares how well a dull, black surface and a shiny, white surface emit and absorb thermal radiation?

	emitting thermal radiation	absorbing thermal radiation
A	dull, black is better	dull, black is better
B	dull, black is better	shiny, white is better
C	shiny, white is better	dull, black is better
D	shiny, white is better	shiny, white is better

34 The diagram represents a water wave that is moving at a speed of 6.0 m/s.



What is the frequency of the wave?

- A 3.0 Hz
- B 4.8 Hz
- C 5.0 Hz
- D 7.5 Hz

35 Which statement about sound is **not** correct?

- A A sound wave of frequency 2000 Hz can be heard by a healthy human ear.
- B Sound waves can travel through a vacuum.
- C The loudness of a sound depends on the amplitude of the sound wave.
- D The pitch of a sound depends on the frequency of the sound wave.

36 A circuit consists of a resistor, a switch and a battery. The switch is closed.

Which expression is used to calculate the charge that passes through the resistor?

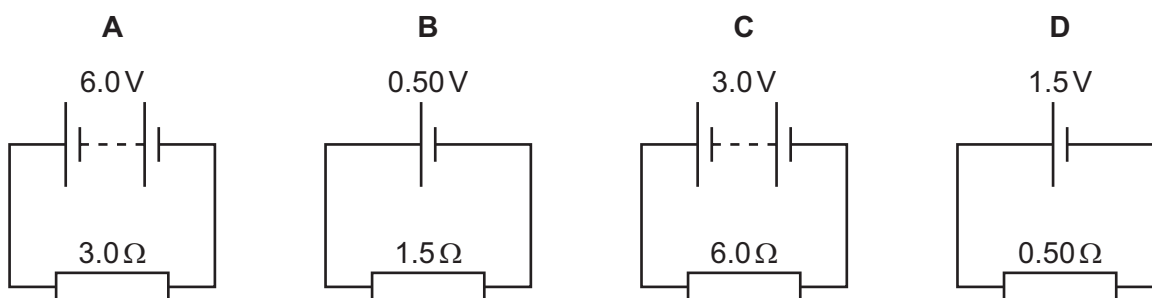
A charge = current \times voltage across the resistor

B charge = $\frac{\text{current}}{\text{voltage across the resistor}}$

C charge = current \times time for which the switch is closed

D charge = $\frac{\text{current}}{\text{time for which the switch is closed}}$

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



38 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

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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