Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/22**

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

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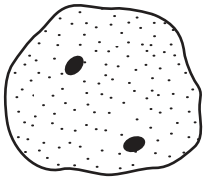
1 The diagram shows a cell from an animal's liver.



In what way does this cell differ from a typical animal cell?

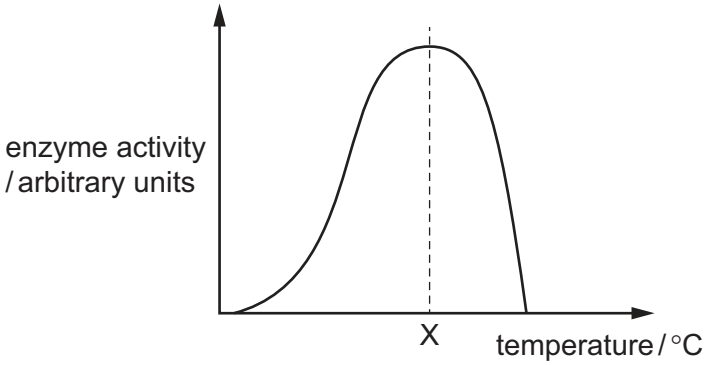
A It contains a central vacuole.

B It contains cytoplasm.

C It contains two nuclei.

D It has a cell wall.

2 The diagram shows how the activity of an enzyme changes with temperature.



This enzyme works in the human body.

What is the most likely value of temperature X?

A 10 °C **B** 40 °C **C** 70 °C **D** 100 °C

3 Some undigested food passes out of the digestive system as faeces.

What is this process?

A absorption

B digestion

C egestion

D ingestion

4 What is a function of the hydrochloric acid produced in the stomach?

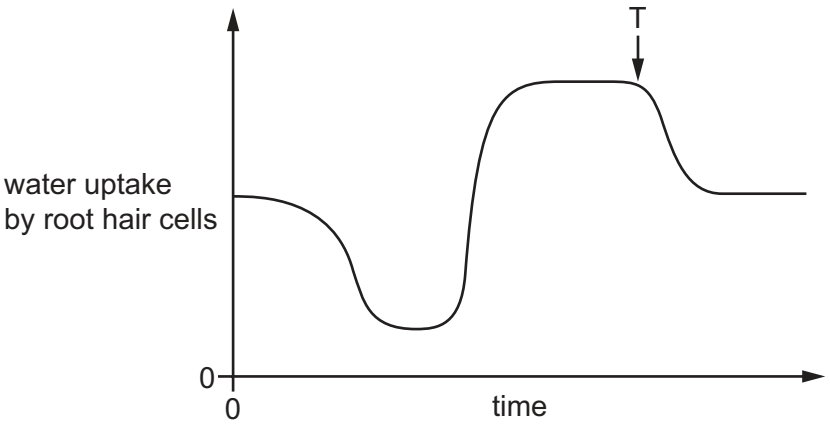
A to help absorption of all food in the stomach

B to kill bacteria in the ingested food

C to prevent chemical digestion

D to prevent the stomach contents being too acidic

5 The graph shows the uptake of water by root hair cells over many hours during a day.



What could have caused the change in the rate of uptake at T?

A decrease in temperature

B decrease in humidity

C increase in light intensity

D increase in temperature

6 How does mucus benefit the gas exchange system?

A It absorbs carbon monoxide before it reaches the alveoli.

B It prevents friction between the air and the trachea.

C It removes the nicotine in cigarette smoke.

D It traps pathogens.

7 Which row about the effects of adrenaline in humans is correct?

	blood glucose concentration	pulse rate
A	increases	decreases
B	increases	increases
C	stays the same	decreases
D	stays the same	increases

8 The following are features of human gametes.

1 have a jelly coat

2 have energy stores

3 have flagella

4 motile

5 produced in large numbers

What are features of human **male** gametes?

A 1 and 2 only **B** 1, 2 and 4 **C** 2, 3 and 5 **D** 3, 4 and 5

9 Which row describes asexual reproduction?

	number of parents	a zygote is produced	offspring identical to the parent
A	1	no	yes
B	1	yes	no
C	2	no	yes
D	2	yes	no

10 On which part of a flower is pollen deposited during pollination?

A ovary

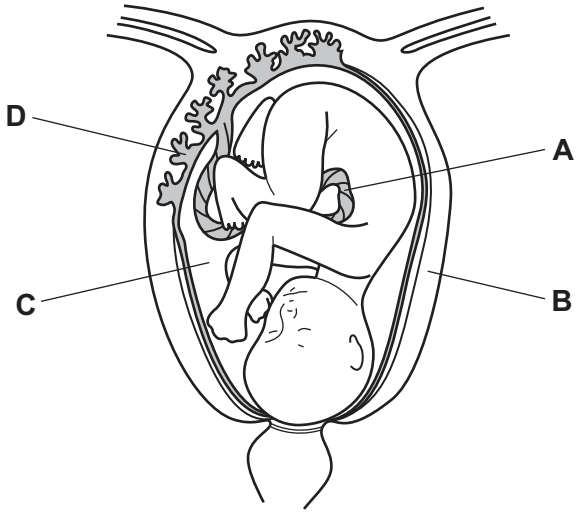
B stamen

C stigma

D style

11 The diagram shows a fetus in the uterus.

Which letter identifies the umbilical cord?



12 Which is an effect of the process of eutrophication of water?

A increased fish population

B increased growth of algae

C decreased availability of nitrates and other ions in the water

D increased levels of dissolved carbon dioxide in the water

13 The diagram shows the trophic levels of a food chain.

producer	→	herbivore	→	carnivore	→	carnivore
1st trophic level		2nd trophic level		3rd trophic level		4th trophic level

Why do most food chains **not** have more than four trophic levels?

A There are too many carnivores in the 3rd trophic level.

B There are too many herbivores in the 2nd trophic level.

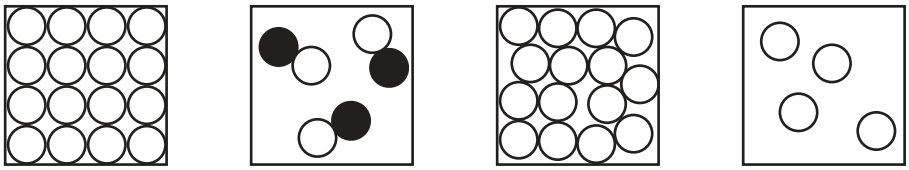
C There is no energy transferred from the 2nd trophic level to the 3rd trophic level.

D There is not enough energy available to be transferred to a 5th trophic level.

[Turn over

14 Which diagram represents particles in a gaseous element?

A **B** **C** **D**



15 Which statement describes a mixture?

A It contains molecules made from the same type of atom.

B It contains only one type of atom.

C It contains two different types of atom joined by chemical bonds.

D It contains two different types of atom that can be separated by physical processes.

16 Which statement about the formation of ions is correct?

A Metal atoms gain electrons to form cations and non-metal atoms lose electrons to form anions.

B Metal atoms gain electrons to form anions and non-metal atoms lose electrons to form cations.

C Metal atoms lose electrons to form cations and non-metal atoms gain electrons to form anions.

D Metal atoms lose electrons to form anions and non-metal atoms gain electrons to form cations.

17 The formula of a magnesium ion is Mg^{2+}.

The formula of a nitride ion is N^{3-}.

What is the formula of magnesium nitride?

A MgN **B** Mg_2N_2 **C** Mg_2N_3 **D** Mg_3N_2

18 Which statement describes the movement of electrons during electrolysis?

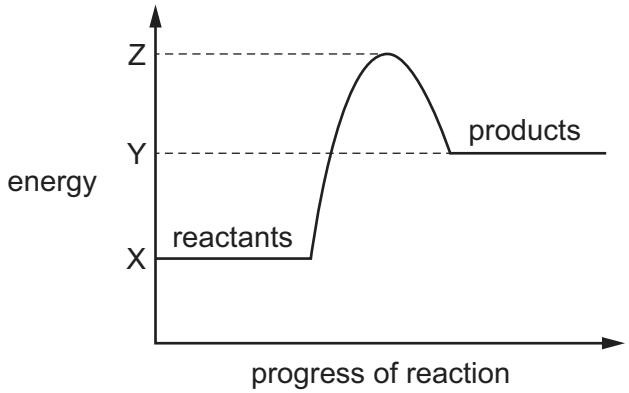
A They move from the anode to the cathode through the external circuit.

B They move from the anode to the cathode through the electrolyte.

C They move from the cathode to the anode through the external circuit.

D They move from the cathode to the anode through the electrolyte.

19 The energy level diagram for a reaction is shown.



Which statement about the reaction is correct?

A The activation energy for this reaction is equal to the value of (Z – Y).

B The energy released by this reaction is equal to the value of (Y – X).

C The energy used to break bonds is more than the energy released in forming bonds.

D The overall energy change for this reaction is equal to the value of (Z – X).

20 What are the effects of increasing the temperature of a reaction?

	frequency of particle collisions	number of particles having activation energy
A	less	more
B	less	same
C	more	more
D	more	same

21 Dilute hydrochloric acid is tested with universal indicator and with calcium carbonate.

Which row shows the results?

	pH	reaction with calcium carbonate
A	2	a colourless gas is given off
B	2	no reaction
C	10	a colourless gas is given off
D	10	no reaction

22 Acid X reacts with metal Y.

A colourless gas is given off and a pale green solution is produced.

Two tests are carried out on the solution.

test	reagent(s) added	result
1	aqueous silver nitrate and nitric acid	white precipitate
2	aqueous sodium hydroxide	green precipitate

What are acid X and metal Y?

	acid	metal
A	hydrochloric	iron
B	hydrochloric	zinc
C	sulfuric	iron
D	sulfuric	zinc

23 Substance X is a coloured solid.

Substance X acts as a catalyst for the reaction between zinc and dilute sulfuric acid.

Molten X can be electrolysed.

What is X?

A a Group I compound

B a Group I metal

C a transition metal compound

D a transition metal

24 The elements in Group II of the Periodic Table show a similar trend in reactivity to the elements in Group I.

Which statement about Group II elements is correct?

A Barium atoms lose electrons more readily than magnesium atoms.

B Calcium reacts with water more rapidly than strontium reacts with water.

C Magnesium displaces strontium ions from aqueous solution.

D Strontium oxide is reduced by heating with carbon.

25 Which method is used to extract copper from copper(II) oxide?

A dissolving copper(II) oxide in hydrochloric acid and then filtering

B dissolving copper(II) oxide in water and then filtering

C heating the copper(II) oxide

D heating the copper(II) oxide mixed with carbon

26 Which process does **not** produce carbon dioxide?

A complete combustion of methane

B cracking of large alkane molecules

C reaction between an acid and magnesium carbonate

D thermal decomposition of calcium carbonate

27 Which statement describes a hydrocarbon?

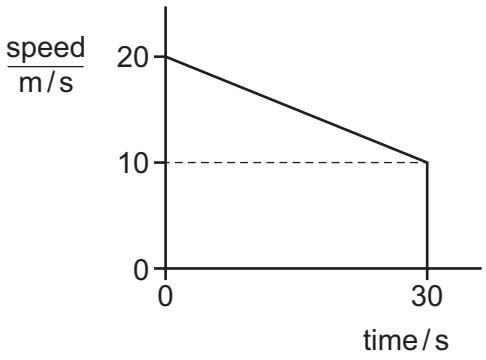
A a compound that burns to form carbon dioxide and hydrogen

B a compound that contains carbon and hydrogen only

C a compound that only contains ionic bonds

D a compound that reacts easily with metals

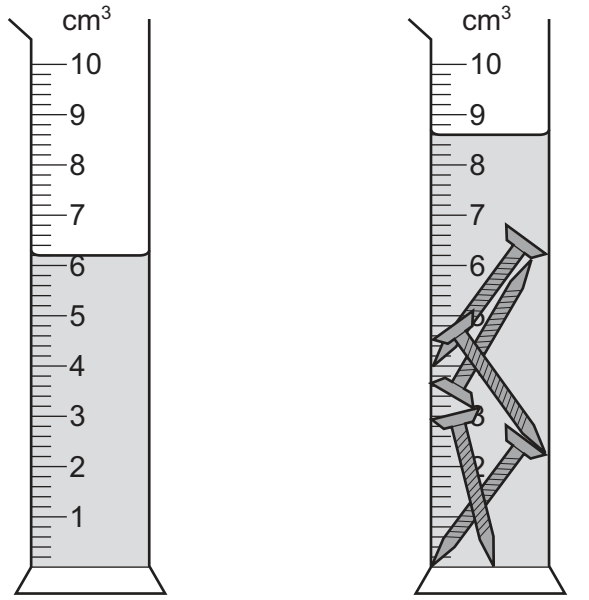
28 The diagram shows the speed–time graph for an object.



What is the distance travelled by the object in 30 s?

A 150 m **B** 300 m **C** 450 m **D** 600 m

29 A measuring cylinder contains water. Five identical metal screws are added to the water as shown.



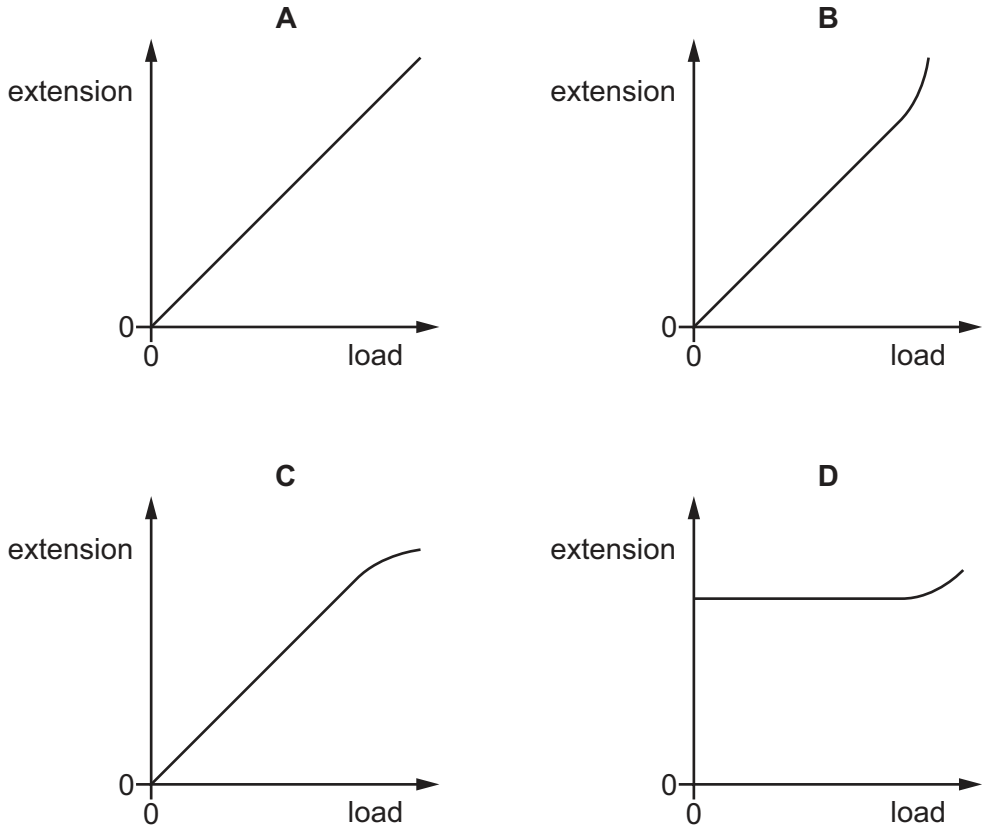
The mass of each screw is 3.8 g.

What is the density of the metal of the screws?

A $1.6\,g/cm^3$ **B** $2.2\,g/cm^3$ **C** $7.9\,g/cm^3$ **D** $8.6\,g/cm^3$

30 A spring is stretched by a load that is gradually increased until the spring extends beyond its limit of proportionality.

Which graph shows the relationship between the load and the extension produced?



31 A device uses 0.50 kJ of energy in 25 minutes.

What is the power of the device?

A 0.33 W **B** 12.5 W **C** 20 W **D** 750 W

32 The molecules in a substance vibrate about fixed positions.

The substance is now cooled.

Which row gives the state of the substance and the effect of cooling on the distance between its molecules?

	state of substance	effect on distance between molecules
A	solid	decreases
B	solid	increases
C	liquid	decreases
D	liquid	increases

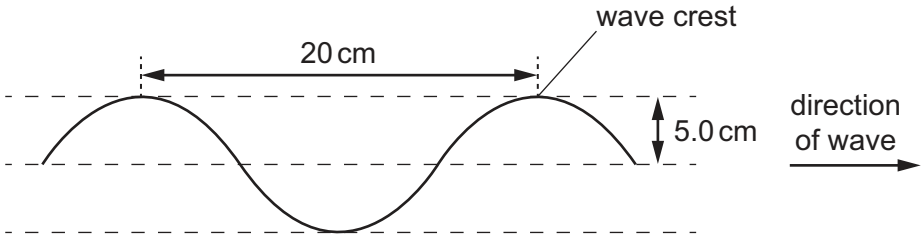
33 In which states of matter can convection occur?

	in a solid	in a liquid	in a gas
A	no	no	yes
B	no	yes	yes
C	yes	no	no
D	yes	yes	no

34 The diagram shows a section of a rope.

Four wave crests pass a point on the rope every second.

Each wave crest travels 80 cm in one second.

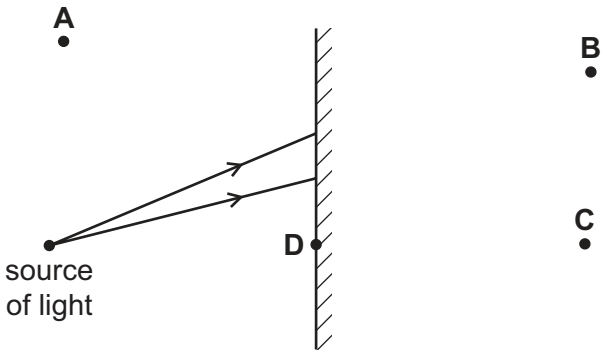


What is the speed of the wave?

A 4.0 cm / s **B** 5.0 cm / s **C** 20 cm / s **D** 80 cm / s

35 A source of light is placed in front of a plane mirror.

Which labelled point shows the position of the image of the source?



36 Radio waves, visible light and X-rays all travel in a vacuum.

Which wave travels at the greatest speed?

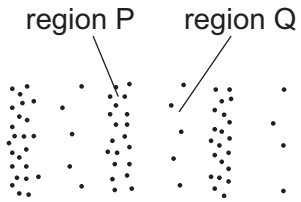
A radio waves

B visible light

C X-rays

D they all travel at the same speed

37 The diagram represents a wave in air. Molecules are closer together in region P than they are in region Q.



What are the names of regions P and Q, and which type of wave is represented?

	region P	region Q	type of wave
A	compression	rarefaction	longitudinal
B	compression	rarefaction	transverse
C	rarefaction	compression	longitudinal
D	rarefaction	compression	transverse

38 A power supply causes a current in a circuit.

The electromotive force (e.m.f.) of the power supply and the resistance of the circuit are both changed.

Which pair of changes **must** result in a smaller current in the circuit?

	e.m.f.	resistance
A	decreased	decreased
B	decreased	increased
C	increased	decreased
D	increased	increased

[Turn over

39 There is a current of 2.0 A in a 4.0 Ω resistor for 20 s.

What is the charge that flows through the resistor in this time and what is the p.d. across it?

	charge / C	p.d. / V
A	10	2.0
B	10	8.0
C	40	2.0
D	40	8.0

40 The current in the starter motor of a car is 400 A when it is connected to a 12 V battery.

How much energy is delivered to the starter motor in 2.0 seconds?

A 0.060 J **B** 67 J **C** 2400 J **D** 9600 J

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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.).