Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/12**

Paper 1 Multiple Choice (Core) **May/June 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.

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[Turn over

1 What is the outermost layer of an animal cell and a plant cell?

	animal cell	plant cell
A	cell membrane	cell membrane
B	cell membrane	cell wall
C	cell wall	cell membrane
D	cell wall	cell wall

2 Most cars burn fossil fuels to release energy for their movement.

Which characteristic of living organisms is similar to this?

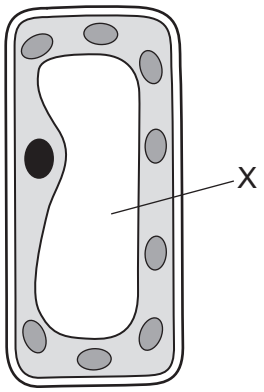
A excretion

B growth

C nutrition

D respiration

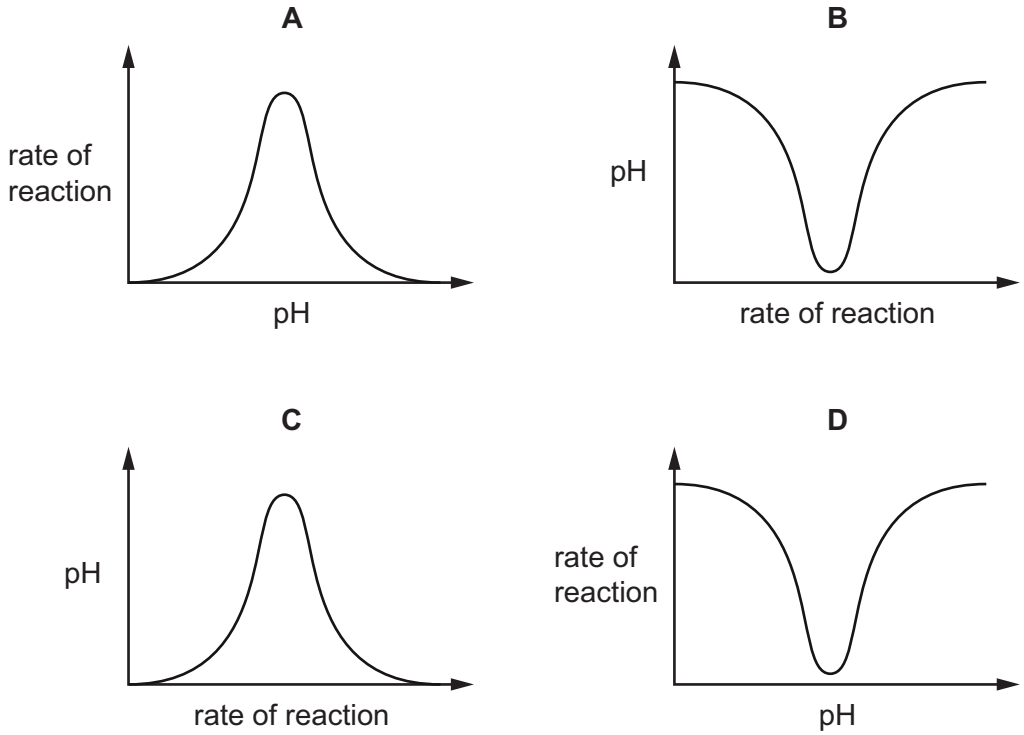
3 The diagram shows a plant palisade mesophyll cell.



What will happen to structure X if this cell is immersed in distilled water or concentrated salty water?

	structure X in distilled water	structure X in concentrated salty water
A	shrink	shrink
B	shrink	swell
C	swell	swell
D	swell	shrink

4 Which graph shows how the rate of an enzyme-controlled reaction varies with changes in pH?



5 A plant that lives in water is exposed to sunlight. After a short period of time, bubbles of gas are given off from the plant.

Which gas do the bubbles contain, and which process produces this gas?

	gas	process
A	carbon dioxide	photosynthesis
B	carbon dioxide	respiration
C	oxygen	photosynthesis
D	oxygen	respiration

6 Which ingredient of a cake contains the **most** protein per gram?

A egg

B flour

C oil

D sugar

[Turn over

7 How is water transported in plants?

A from the leaves to the roots through the phloem

B from the leaves to the roots through the xylem

C from the roots to the leaves through the phloem

D from the roots to the leaves through the xylem

8 Physical activity affects our rate and depth of breathing.

What happens during **increased** physical activity?

	rate of breathing	depth of breathing
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

9 Some examples of responses in the body are listed.

1 decreased pupil diameter

2 increased breathing rate

3 increased pulse rate

Which responses are caused by the secretion of adrenaline?

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

10 Some examples of how parts of a plant grow are listed.

1 grow away from gravity

2 grow away from the direction of light

3 grow towards gravity

4 grow towards the direction of light

Which growth responses are due to gravitropism?

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

11 Which statement about asexual reproduction is correct?

A It produces genetically different offspring from 1 parent.

B It produces genetically different offspring from 2 parents.

C It produces genetically identical offspring from 1 parent.

D It produces genetically identical offspring from 2 parents.

12 Some organisms obtain their energy from dead or waste organic matter.

Which term describes them?

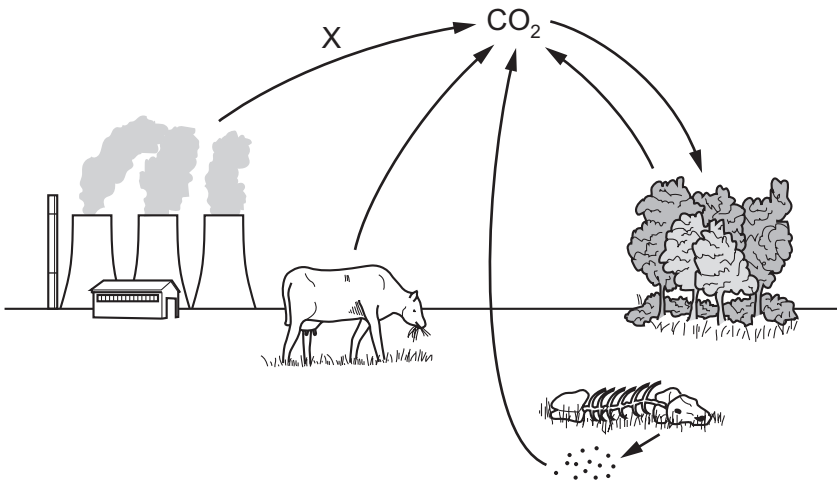
A carnivores

B decomposers

C herbivores

D producers

13 The diagram shows part of the carbon cycle.



Which process is the arrow marked X?

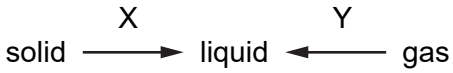
A combustion

B fossilisation

C photosynthesis

D respiration

14 Some changes of state are shown.



What are changes X and Y?

	X	Y
A	freezing	boiling
B	freezing	condensing
C	melting	boiling
D	melting	condensing

15 Three changes are listed.

1 Dilute hydrochloric acid is reacted with aqueous sodium hydroxide.

2 The mixture formed is then heated until all of the water is evaporated.

3 The solid that is formed is then heated until it melts.

Which row describes changes 1, 2 and 3?

	1	2	3
A	chemical	chemical	physical
B	chemical	physical	physical
C	physical	physical	chemical
D	physical	chemical	chemical

16 Substance Z exists as molecules that contain only one type of atom.

What is Z?

A a compound

B a mixture

C an element

D a noble gas

17 Which substance contains covalent bonds?

A CH_4 **B** KOH **C** $NaCl$ **D** $PbBr_2$

18 Which row shows the correct formula for the named acid?

	acid	formula
A	nitric acid	HCl
B	nitric acid	HNO_3
C	sulfuric acid	HCl
D	sulfuric acid	HNO_3

19 Dilute sulfuric acid breaks down when electricity is passed through it.

What is the name of this process?

A cracking

B crystallisation

C distillation

D electrolysis

20 Which statements describe an endothermic reaction?

1 Energy is given out.

2 Energy is taken in.

3 The temperature of the reaction mixture decreases.

4 The temperature of the reaction mixture increases.

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

21 Carbon reacts with carbon dioxide at high temperatures.

carbon + carbon dioxide $\rightarrow$ carbon monoxide

Which statement about the reaction is correct?

A Both carbon and carbon dioxide are oxidised.

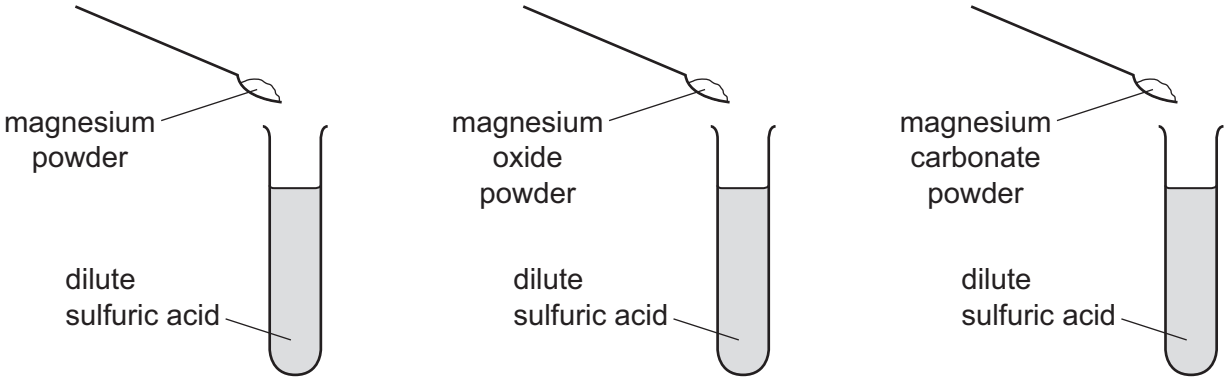
B Both carbon and carbon dioxide are reduced.

C The carbon is oxidised and the carbon dioxide is reduced.

D The carbon is reduced and the carbon dioxide is oxidised.

[Turn over

22 Three powders are added to dilute sulfuric acid, as shown.



Which powders react to produce water?

	magnesium	magnesium oxide	magnesium carbonate
A	✓	✓	✗
B	✓	✗	✗
C	✗	✓	✓
D	✗	✗	✓

key

✓ = does produce water

✗ = does not produce water

23 The results of two tests on substance Q are shown.

test	result
add dilute hydrochloric acid to solid Q	bubbles of colourless gas, R, which turns limewater milky
add aqueous sodium hydroxide to a solution of Q	green precipitate

Which cation is present in Q and what is gas R?

	cation present in Q	gas R
A	iron(II)	carbon dioxide
B	iron(II)	chlorine
C	iron(III)	carbon dioxide
D	iron(III)	chlorine

24 Which substance does **not** react with chlorine?

A H_2 **B** Kr **C** Li **D** NaBr

25 Copper is below both carbon and hydrogen in the reactivity series.

How is copper extracted?

A Heat copper sulfate crystals.

B Heat copper oxide with carbon.

C Heat copper oxide with carbon dioxide.

D Heat copper oxide with dilute hydrochloric acid.

26 Which colour change is seen when water is added to anhydrous cobalt(II) chloride?

A blue to pink

B blue to white

C pink to blue

D white to blue

27 Methane, ethane and propane are all alkanes. Their formulae are shown.

methane, CH_4

ethane, C_2H_6

propane, C_3H_8

Which statement is **not** correct?

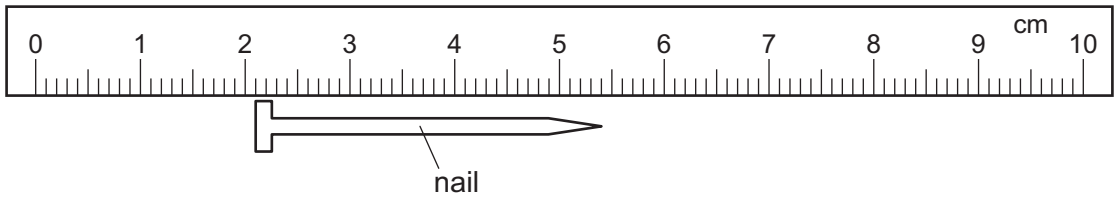
A All three compounds are hydrocarbons.

B All three compounds burn.

C Methane is the main constituent of natural gas.

D Propane burns completely to form carbon dioxide and hydrogen.

28 A ruler is used to measure the length of a nail, as shown.



What is the length of the nail?

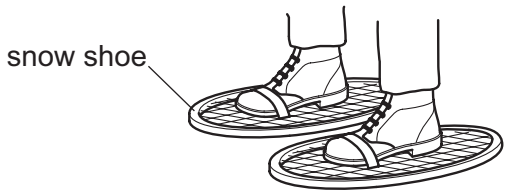
A 2.1 cm **B** 3.3 cm **C** 5.4 cm **D** 7.5 cm

29 A metre rule has a mass of 120 g. The gravitational field strength *g* is 10 N / kg.

What is the weight of the metre rule?

A 1.2 N **B** 1.2 kg **C** 1200 N **D** 1200 kg

30 A man walking on snow in normal shoes sinks into the snow. The man puts on snow shoes and does not sink into the snow.



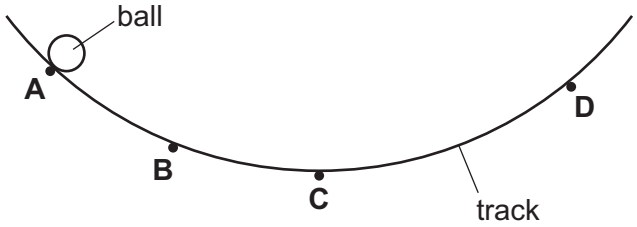
Which row explains why this happens?

	area of contact with snow	weight of man
A	decreased	decreased
B	decreased	unchanged
C	increased	decreased
D	increased	unchanged

31 A ball is released from rest at point **A** on a curved track.

The ball rolls along the track past points **B** and **C**, then reaches point **D**.

At which labelled point does the ball have maximum kinetic energy?



32 Which group of energy sources consists of only renewable sources?

A geothermal, nuclear, solar

B geothermal, solar, wind

C nuclear, solar, wind

D oil, geothermal, solar

33 Air is trapped in a sealed glass bottle that has a fixed volume.

The temperature of the air in the bottle decreases.

Which statement describes what happens to the air in the bottle?

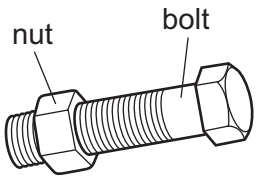
A The average separation of the molecules decreases and the pressure decreases.

B The average separation of the molecules decreases but the pressure remains the same.

C The average separation of the molecules remains the same but the pressure decreases.

D The average separation of the molecules remains the same and the pressure remains the same.

34 A mechanic cannot remove a large steel nut from a steel bolt because it is too tight.



What does the mechanic do to help remove the nut?

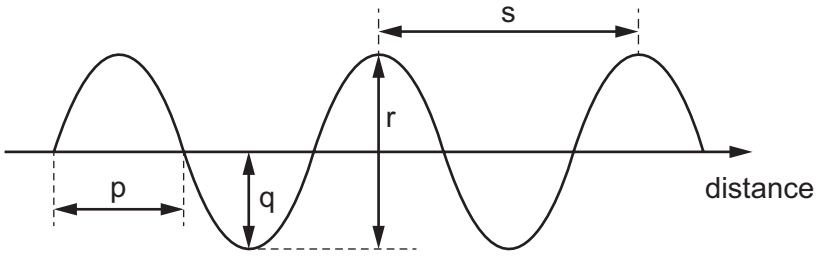
A cool the nut and heat the bolt

B heat the bolt only

C heat the nut and the bolt through the same temperature rise

D heat the nut only

35 The diagram represents a wave.



Which row shows the wavelength and the amplitude of the wave?

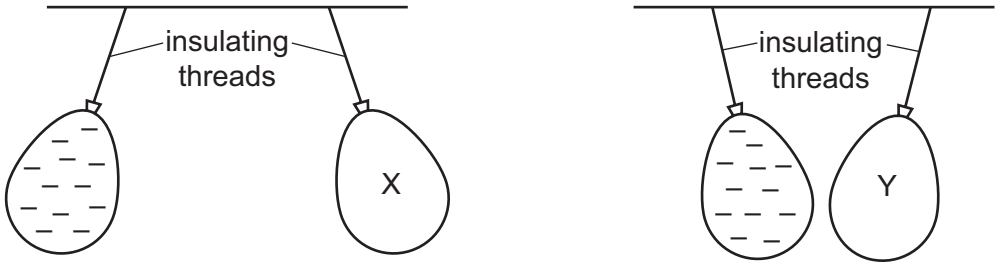
	wavelength	amplitude
A	p	q
B	p	r
C	s	q
D	s	r

36 A student investigating the speed of sound stands at a distance of 50 m from a wall. The student makes a short, sharp sound and then hears an echo from the wall 0.30 s later.

Which calculation gives the speed of the sound in m / s?

A $\frac{50}{0.60}$ **B** $\frac{50}{0.30}$ **C** $\frac{100}{0.60}$ **D** $\frac{100}{0.30}$

37 Two balloons X and Y are suspended by insulating threads. They are each held near a negatively charged balloon. The balloons hang as shown.



What is the charge on balloon X and what is the charge on balloon Y?

	balloon X	balloon Y
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

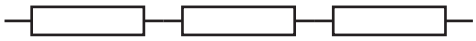
38 Which row gives the units for resistance and potential difference (p.d.)?

	resistance	p.d.
A	ohm	ampere
B	ohm	volt
C	volt	ampere
D	volt	volt

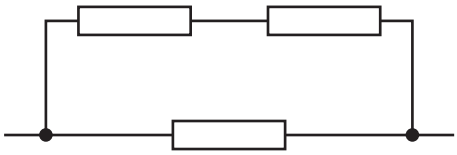
39 The diagrams show three identical resistors connected in different arrangements.

Which arrangement has the greatest resistance?

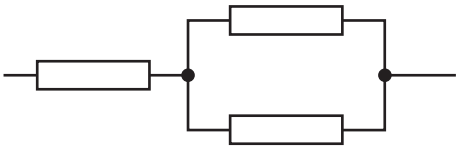
A



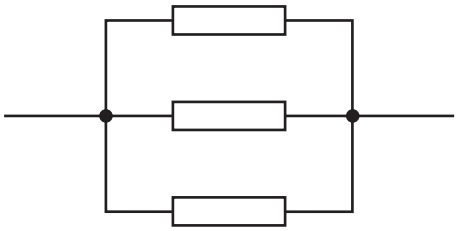
B



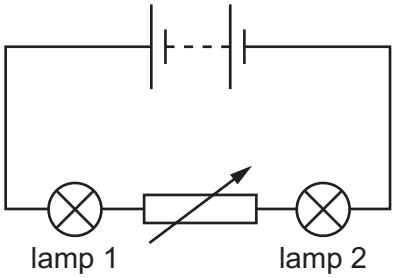
C



D



40 A circuit contains two lamps and a variable resistor.



The resistance of the variable resistor is increased.

What happens to the brightness of lamp 1 and what happens to the brightness of lamp 2?

	brightness of lamp 1	brightness of lamp 2
A	decreases	decreases
B	decreases	increases
C	no change	decreases
D	no change	increases

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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.).