Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/22**

Paper 2 Multiple Choice (Extended) **May/June 2019**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

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 separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

1 A student is reading a text book. He finds the following definition about how substances move in and out of cells.

> The net movement of water molecules from a region of higher water potential to a region of lower water potential through a partially permeable membrane is called

The corner of the page has been torn.

What is the missing word at the end of the sentence?

A diffusion

B dissolving

C evaporation

D osmosis

2 An incomplete symbol equation for photosynthesis is given below.

$$x CO_y + x H_2O \rightarrow C_x H_z O_x + x O_y$$

Which row shows the numbers that should replace *x*, *y* and *z* to make the equation balanced?

	x	*y*	*z*
A	6	2	6
B	6	12	2
C	6	2	12
D	12	6	2

3 A person has bleeding gums.

Which vitamin could be deficient in his diet, and which food should he eat to provide this vitamin?

	vitamin	food
A	C	fish
B	C	oranges
C	D	fish
D	D	oranges

4 What is the purpose of mechanical digestion?

A to break down food into smaller pieces

B to break down insoluble foods into soluble particles

C to change food so that it can be absorbed into the blood

D to digest insoluble food components using enzymes

5 A student observes an artery using a microscope.

Which feature is present in an artery?

A a wide lumen

B valves

C walls with a thick layer of muscle

D wall only a single cell in thickness

6 What is the route for carbon dioxide passing out of the body?

A alveoli → capillaries → bronchioles → bronchi → trachea → larynx

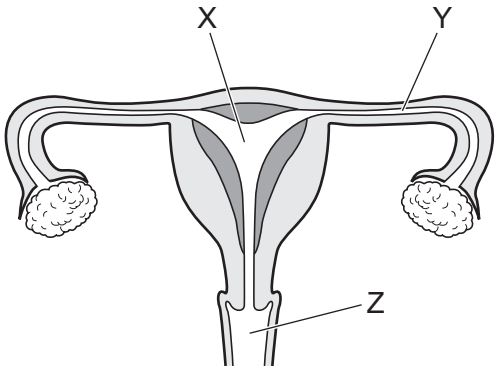
B alveoli → capillaries → bronchi → bronchioles → larynx → trachea

C capillaries → alveoli → bronchi → bronchioles → trachea → larynx

D capillaries → alveoli → bronchioles → bronchi → trachea → larynx

[Turn over

7 The diagram shows the female reproductive system.



What are the functions of the parts labelled X, Y, and Z?

	X	Y	Z
A	development of fetus	release of female gametes	ring of muscle at opening of uterus
B	development of fetus	site of fertilisation	receives penis during intercourse
C	receives penis during intercourse	release of female gametes	ring of muscle at opening of uterus
D	receives penis during intercourse	site of fertilisation	development of fetus

8 How does adrenaline affect blood glucose concentration and pulse rate?

	blood glucose concentration	pulse rate
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

9 Diagram 1 shows a germinating bean seed placed horizontally.

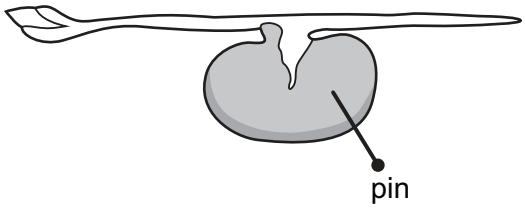


diagram 1

Diagram 2 shows the same seed after three days. The shoot has grown upwards because of the action of an auxin.

Where is the auxin produced?

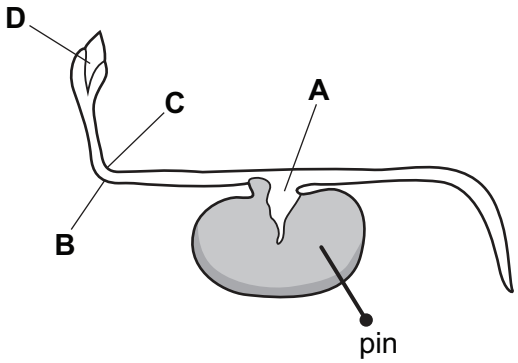


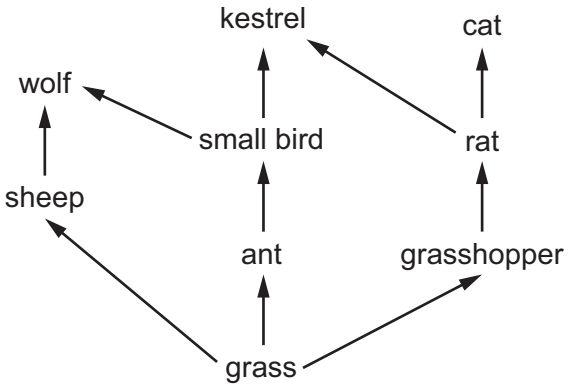
diagram 2

10 What are the features of sexual reproduction?

	fusion of nuclei	nature of offspring
A	no	genetically dissimilar
B	yes	genetically identical
C	no	genetically identical
D	yes	genetically dissimilar

[Turn over

11 The diagram represents several food chains in a food web.



How many different food chains are there in the food web shown?

A 3 **B** 4 **C** 5 **D** 9

12 Which row shows the substances that diffuse from the mother to the fetus at the placenta?

	carbon dioxide	nutrients	oxygen	waste products
A	✓	✗	✓	✗
B	✓	✓	✗	✓
C	✗	✓	✓	✗
D	✗	✗	✓	✓

13 Which term is defined as a unit containing all of the organisms and their environment, interacting with each other?

A carbon cycle

B ecosystem

C food chain

D food web

14 A molecule of hydrogen has the formula H_2.

A molecule of a protein contains several different elements.

Which statement about these molecules is correct?

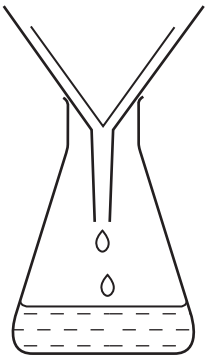
A They both contain cations and anions bonded together.

B They both contain different types of atom.

C They both contain more than one atom bonded together.

D They both contain only one type of atom.

15 The diagram shows apparatus used for filtration.



Why can sugar and salt **not** be separated by using this apparatus?

A They are both compounds.

B They are both white.

C They both dissolve in water.

D They both have the same size particles.

16 An atom of an element has the proton number 16 and the nucleon number 36.

Which row shows the number of neutrons in the atom and the group number of the element in the Periodic Table?

	number of neutrons in the atom	group number
A	20	VI
B	20	VIII
C	36	VI
D	36	VIII

17 Which statement about sodium ions and chloride ions in sodium chloride is **not** correct?

A They are strongly attracted to each other.

B They both have noble gas electronic structures.

C They are arranged in a regular lattice.

D They share pairs of electrons.

[Turn over

18 Which statement about the electrolysis of molten magnesium chloride is correct?

A Cations form atoms by losing electrons.

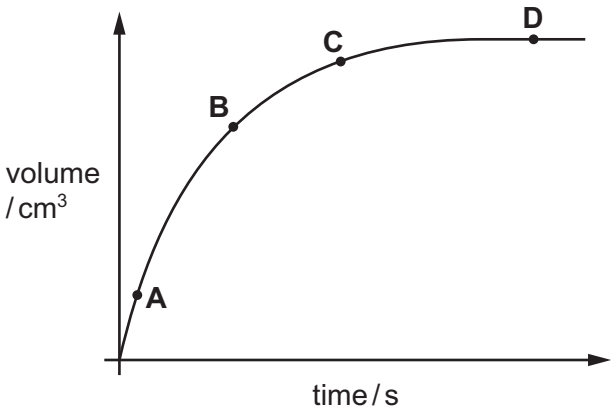
B Chlorine atoms gain electrons to form chloride ions.

C Magnesium ions gain electrons to form magnesium atoms.

D Magnesium is produced at the anode and chlorine is formed at the cathode.

19 The graph shows the volume of hydrogen gas produced when dilute hydrochloric acid reacts with zinc.

At which point is the rate of reaction greatest?



20 Which aqueous ion gives a white precipitate with aqueous sodium hydroxide and with aqueous ammonia?

A Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}

21 Some properties of three metals in Group I are shown.

	melting point / °C	relative softness	reaction with water
sodium	98	soft	reacts rapidly
potassium	64	very soft	burns on contact with water
caesium	29	very, very soft	violently explosive

Rubidium is below potassium in Group I.

What is a property of rubidium?

A It explodes on contact with water.

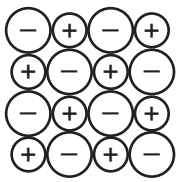
B It is a hard solid.

C It is a liquid at 20 °C.

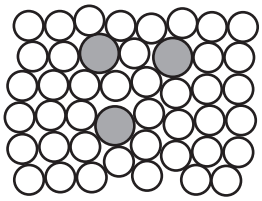
D It is less dense than potassium.

22 Which diagram represents brass?

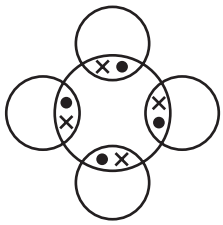
A



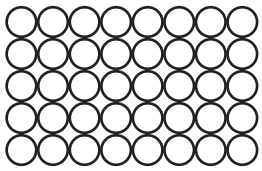
B



C



D



23 Zinc reacts with chromium oxide. The reaction equation is shown.

$$3Zn + Cr_2O_3 \rightarrow 2Cr + 3ZnO$$

Which statement about this reaction is correct?

A Chromium is above zinc in the reactivity series.

B Chromium oxide is the oxidising agent because it gains oxygen.

C Chromium oxide is the reducing agent because it loses oxygen.

D Zinc is the reducing agent because it gains oxygen.

24 Which statement about water is **not** correct?

A A water molecule consists of three atoms covalently bonded together.

B The water supply is treated with chlorine to kill the bacteria in it.

C Water changes the colour of cobalt chloride paper from blue to pink.

D Water has a low melting point because covalent bonds are weak.

25 Which statement shows that petroleum is a mixture?

A Petroleum can be burned as a fuel.

B Petroleum can be separated into fractions by distillation.

C Petroleum is a fossil fuel formed over millions of years.

D Petroleum is a thick, black liquid.

26 Which statement about alkanes is correct?

A Alkanes are compounds containing carbon, hydrogen and oxygen.

B Alkanes are saturated hydrocarbons.

C Ethane is used to make poly(ethene).

D Methane is the only alkane that does not contain a double bond.

[Turn over

27 Which row identifies the temperature used and describes the change to the alkane molecules during the cracking process?

	temperature / °C	change to the alkane molecules
A	100	become larger
B	100	become smaller
C	500	become larger
D	500	become smaller

28 The speed of a car is measured at 1.0 s intervals. The results are shown in the table.

time / s	0	1.0	2.0	3.0	4.0
$\frac{\text{speed}}{\text{km/h}}$	20	21	23	26	30

Which is a description of the motion of the car?

A at rest

B constant acceleration

C constant speed

D non-constant acceleration

29 A metal ball of mass 0.050 kg is released from rest and falls to the ground. It hits the ground with kinetic energy 1.2 J.

The gravitational field strength is 10 N / kg. Air resistance can be ignored.

From what height above the ground is the ball released?

A 0.042 m **B** 0.42 m **C** 2.4 m **D** 24 m

30 Which mode of transport uses a renewable energy source?

A a coal-fired steam train

B a nuclear-powered submarine

C a petrol-engined car

D a sailing boat moved by the wind

31 A solid is heated.

Which two properties of the solid **both** change as a result?

A density and volume

B density and weight

C mass and volume

D mass and weight

32 Non-metal solids conduct heat but not as well as metals.

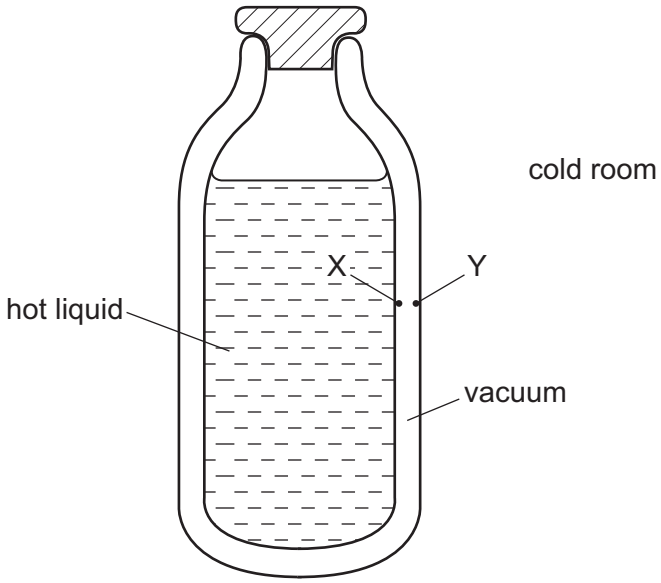
Which row describes how non-metal solids conduct heat?

	molecular vibration	heat transfer by electrons
A	no	no
B	no	yes
C	yes	no
D	yes	yes

[Turn over

33 The diagram shows a vacuum flask containing a hot liquid in a cold room.

X and Y are points on the inside surfaces of the walls of the flask.



How is thermal energy transferred through the vacuum between X and Y?

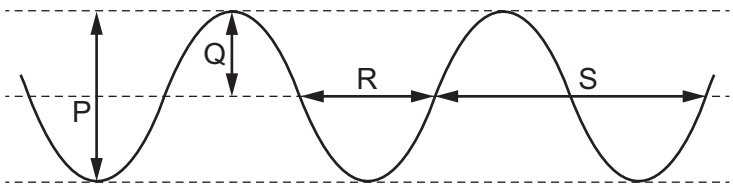
A by conduction and convection

B by conduction only

C by radiation and convection

D by radiation only

34 The diagram represents a wave at one moment.



Which labelled arrows represent the amplitude and the wavelength of the wave?

	amplitude	wavelength
A	P	R
B	P	S
C	Q	R
D	Q	S

35 Which wave is longitudinal?

A microwave

B light wave

C radio wave

D sound wave

36 Which statement about gamma rays and radio waves is correct?

A In a vacuum, gamma rays and radio waves travel at 300 m / s.

B In a vacuum, gamma rays and radio waves travel at 3.0×10^8 m / s.

C In a vacuum, gamma rays travel faster than radio waves.

D In a vacuum, radio waves travel faster than gamma rays.

37 Four wires are made of the same material. They have different lengths and different cross-sectional areas.

Which wire has the smallest resistance?

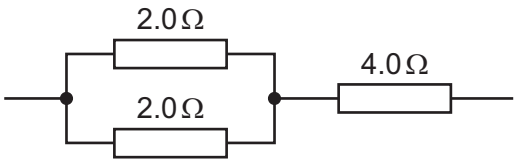
	length	cross-sectional area
A	l	$\frac{A}{2}$
B	l	A
C	$2l$	$\frac{A}{2}$
D	$2l$	A

[Turn over

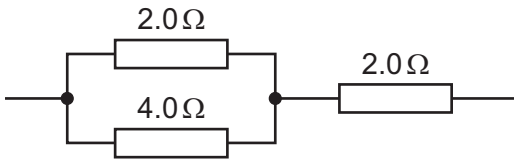
38 Three resistors, one of resistance 4.0 Ω and two of resistance 2.0 Ω, are connected in different arrangements.

Which arrangement has a total resistance of 5.0 Ω?

A



B



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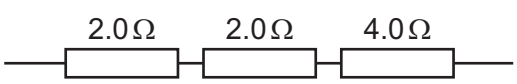

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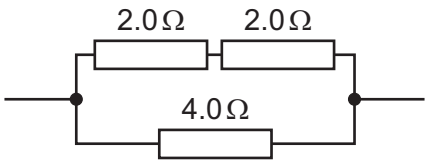

39 There is a current of 2.0 A in a resistor. The power produced in the resistor is 8.0 W.

What is the potential difference across the resistor?

A 0.25 V **B** 4.0 V **C** 10 V **D** 16 V

40 A mains circuit can safely supply a current of up to 40 A.

The current in a hairdryer is 2 A when it is operating normally. The hairdryer is connected to the mains by a lead which can safely carry up to 5 A.

What is the correct fuse to protect the hairdryer?

A 1 A fuse

B 3 A fuse

C 10 A fuse

D 50 A fuse

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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.).