



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/11

October/November 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.

This document consists of **15** printed pages and **1** blank page.

- 1 A biologist keeps a potted plant in a laboratory.

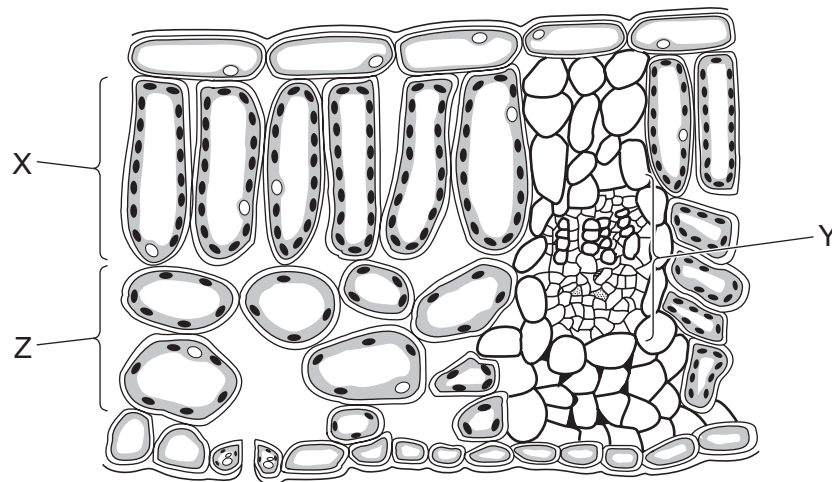
Which feature of the potted plant shows that it is a living organism?

- A It grows larger over time.
- B It has green leaves.
- C The compost in the pot dries after he waters it.
- D The stems contain xylem.

- 2 Which is the correct description of diffusion?

- A net movement of particles from a region of higher concentration to a region of lower concentration down a concentration gradient
- B net movement of particles from a region of higher concentration to a region of lower concentration against a concentration gradient
- C net movement of particles from a region of lower concentration to a region of higher concentration down a concentration gradient
- D net movement of particles from a region of lower concentration to a region of higher concentration against a concentration gradient

- 3 The diagram shows a section through a leaf.



Which row correctly identifies the labelled parts of the leaf section?

	X	Y	Z
A	cuticle	vascular bundle	palisade mesophyll
B	palisade mesophyll	vascular bundle	spongy mesophyll
C	palisade mesophyll	cuticle	spongy mesophyll
D	spongy mesophyll	cuticle	vascular bundle

4 What is **not** absorbed from the alimentary canal into the blood?

- A fibre
- B glucose
- C mineral salts
- D vitamin C

5 Which row shows where digestion occurs?

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

6 Which blood vessel carries blood from the heart to the body?

- A aorta
- B pulmonary artery
- C pulmonary vein
- D vena cava

7 The concentrations of carbon dioxide and oxygen in expired air differ from the concentrations in inspired air.

	gas	concentration in expired air
1	carbon dioxide	higher
2	carbon dioxide	lower
3	oxygen	higher
4	oxygen	lower

Which rows correctly show the difference?

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

- 8 Glucose is involved in the reaction in the body shown below.



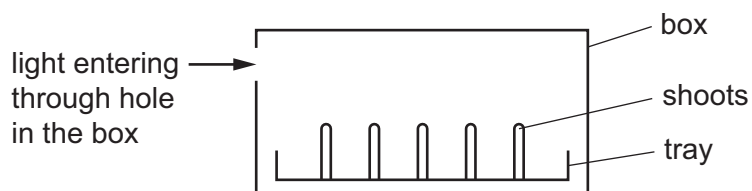
What are P, Q and R?

	P	Q	R
A	carbon dioxide	oxygen	water
B	carbon dioxide	water	oxygen
C	oxygen	water	carbon dioxide
D	water	carbon dioxide	oxygen

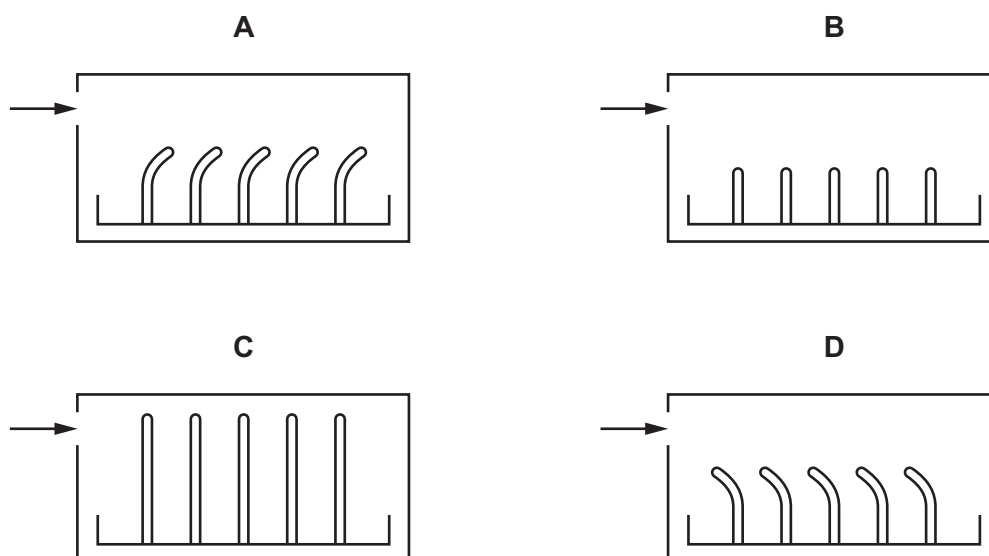
- 9 What is the effect of adrenaline on the rate of breathing and pulse rate?

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

- 10 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?

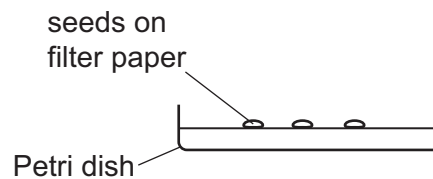


11 Which statement about sexual reproduction is **always** correct?

- A It involves only one parent.
- B It involves the fusion of nuclei.
- C It produces genetically identical offspring.
- D It takes place only in animals.

12 A student set up an experiment to investigate the conditions needed for the germination of seeds.

She set up four Petri dishes, as shown.



The table shows how the seeds were treated.

In which Petri dish would most seeds germinate?

	temperature	watered
A	warm	no
B	warm	yes
C	cold	no
D	cold	yes

13 Which row describes deforestation and states one of its effects?

	description of deforestation	effect on the atmosphere
A	trees planted	decrease in oxygen
B	trees planted	increase in oxygen
C	trees cut down	decrease in carbon dioxide
D	trees cut down	increase in carbon dioxide

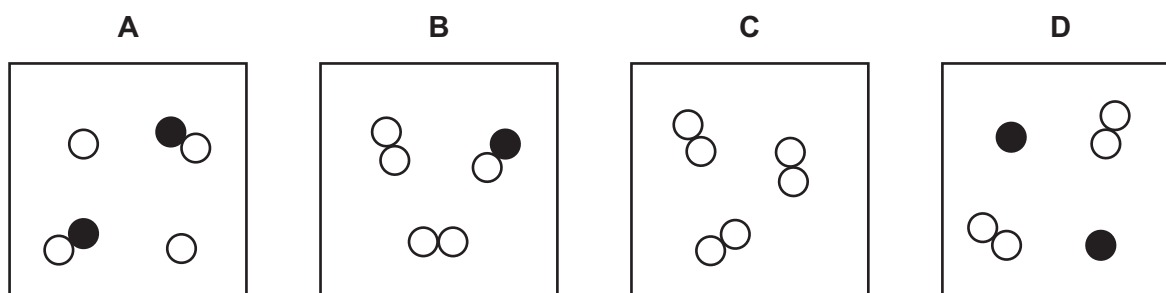
14 Four processes are listed.

- 1 melting of ice
- 2 electrolysis of molten lead(II) bromide
- 3 combustion of carbon
- 4 rusting of iron

Which processes are chemical changes?

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

15 Which diagram represents a mixture of two different elements?



16 P, Q and R are three particles.

Particle P contains 6 protons, 6 neutrons and 6 electrons.

Particle Q contains 1 proton, 2 neutrons and no electrons.

Particle R contains 11 protons, 12 neutrons and 10 electrons.

Which row about P, Q and R is correct?

	P	Q	R
A	has atomic number 6	has a mass number of 2	has a positive charge
B	has no overall electrical charge	has an atomic number of 1	has a mass number of 23
C	is a carbon atom	is a nucleus	has a negative charge
D	is a carbon nucleus	has a positive charge	is a particle of sodium

- 17** The fertiliser ammonium sulfate has the formula $(\text{NH}_4)_2\text{SO}_4$.

How many atoms of each element are present in the formula?

	number of hydrogen atoms	number of nitrogen atoms	number of oxygen atoms	number of sulfur atoms
A	4	1	1	1
B	4	2	4	1
C	8	1	4	1
D	8	2	4	1

- 18** Element X is a non-metal used in the treatment of the water supply.

It is made during the electrolysis of a metal salt.

What is the colour of X and at which electrode is it made?

	colour	electrode
A	red	anode
B	red	cathode
C	yellow-green	anode
D	yellow-green	cathode

- 19** A piece of magnesium ribbon is added to dilute hydrochloric acid at 20°C .

The mixture starts to fizz and the temperature rises to 32°C .

The fizzing then stops and the temperature slowly decreases until it reaches 20°C . The temperature then remains constant.

Which statement is correct?

- A** The reaction is endothermic.
- B** The reaction is exothermic.
- C** There is an endothermic reaction followed by an exothermic reaction.
- D** There is an exothermic reaction followed by an endothermic reaction.

20 Limestone chips react with dilute hydrochloric acid.

Which change decreases the speed of the reaction?

- A** adding a catalyst
- B** decreasing the temperature
- C** increasing the concentration of hydrochloric acid
- D** using limestone powder

21 In which reaction is a metal oxide being reduced?

- A** copper oxide + hydrochloric acid → copper chloride + water
- B** iron(II) oxide + oxygen → iron(III) oxide
- C** lead oxide + carbon → lead + carbon dioxide
- D** zinc oxide + sulfuric acid → zinc sulfate + water

22 Magnesium reacts with substance Z.

A salt and hydrogen are made in this reaction.

Which type of substance is Z?

- A** acid
- B** alkali
- C** element
- D** non-metal

23 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the group number that includes elements X and Y and which element is lighter in colour?

	group number	lighter in colour
A	I	X
B	I	Y
C	VII	X
D	VII	Y

24 Which statement about alloys is correct?

- A They are made from metals because metals are poor electrical conductors.
- B They are mixtures of compounds that contain metals.
- C They have all the same properties as the metals from which they are made.
- D They have different properties to the metals from which they are made.

25 Which row describes the method of extraction and the position of the metal in the reactivity series relative to zinc?

	metal	method of extraction	position of the metal in the reactivity series
A	aluminium	electrolysis of bauxite	above zinc
B	aluminium	heating metal oxide with carbon	below zinc
C	copper	heating metal oxide with carbon	above zinc
D	copper	electrolysis of bauxite	below zinc

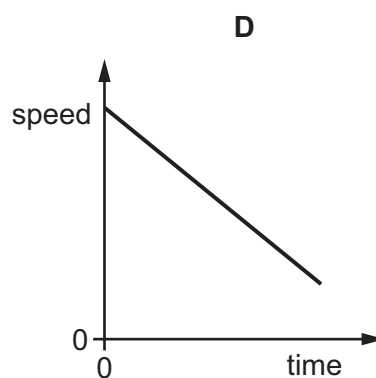
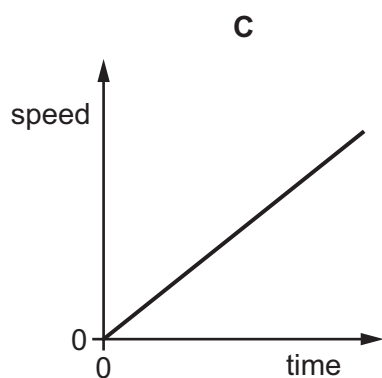
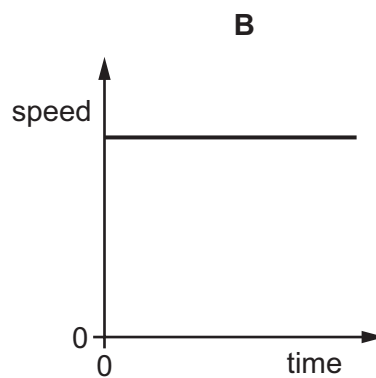
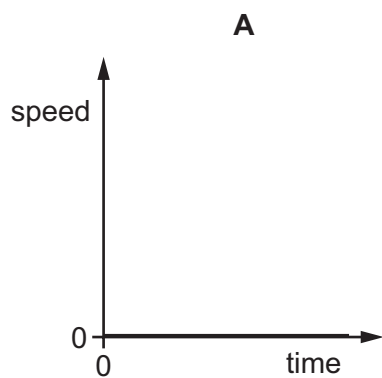
26 Which gas is **not** present in clean air?

- A carbon monoxide
- B neon
- C nitrogen
- D water vapour

27 What are the products of the complete combustion of a hydrocarbon?

- A carbon and hydrogen
- B carbon dioxide and hydrogen
- C carbon dioxide and water
- D carbon monoxide and water

28 Which speed–time graph represents an object moving with constant speed?



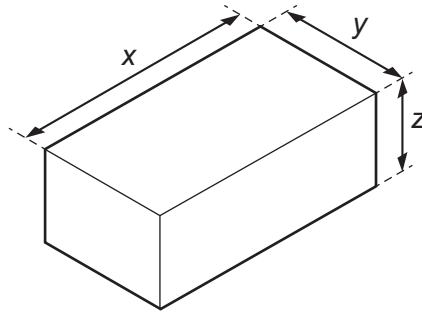
29 A body has mass and is in a gravitational field.

What property does the body possess because it is in a gravitational field?

- A** density
- B** resistance
- C** volume
- D** weight

- 30 A solid cuboid block of metal has density ρ .

The diagram shows its dimensions.



Which expression is used to calculate the mass of the block?

- A** $\frac{\rho}{xy}$ **B** $\frac{\rho}{xyz}$ **C** ρxy **D** ρxyz
- 31 A crane is used to lift a load vertically.
- Which situation requires a crane that produces greater power?
- A** lifting a lighter load through the same distance in the same time
B lifting the same load through a smaller distance in the same time
C lifting the same load through the same distance in a longer time
D lifting the same load through the same distance in a shorter time
- 32 Which device uses a non-renewable energy source?
- A** diesel engine
B solar cell
C water turbine
D windmill
- 33 How are particles of a liquid arranged?

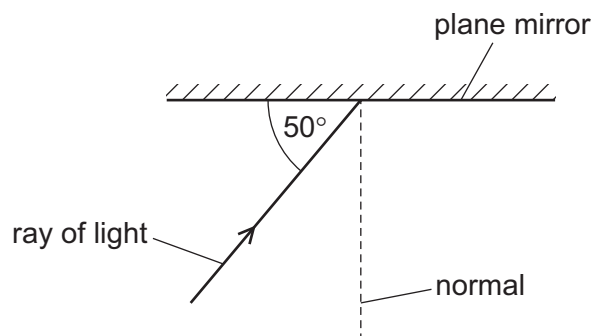
	arrangement of particles	separation of particles
A	at random	close
B	at random	far apart
C	regularly	close
D	regularly	far apart

- 34** A metal pan containing water is heated on a hot stove. Energy is transferred thermally from the stove to the water.

How is the energy transferred through the pan and then throughout the water?

	through the pan	throughout the water
A	conduction	conduction
B	conduction	convection
C	convection	conduction
D	convection	convection

- 35** The diagram shows light striking a plane mirror.

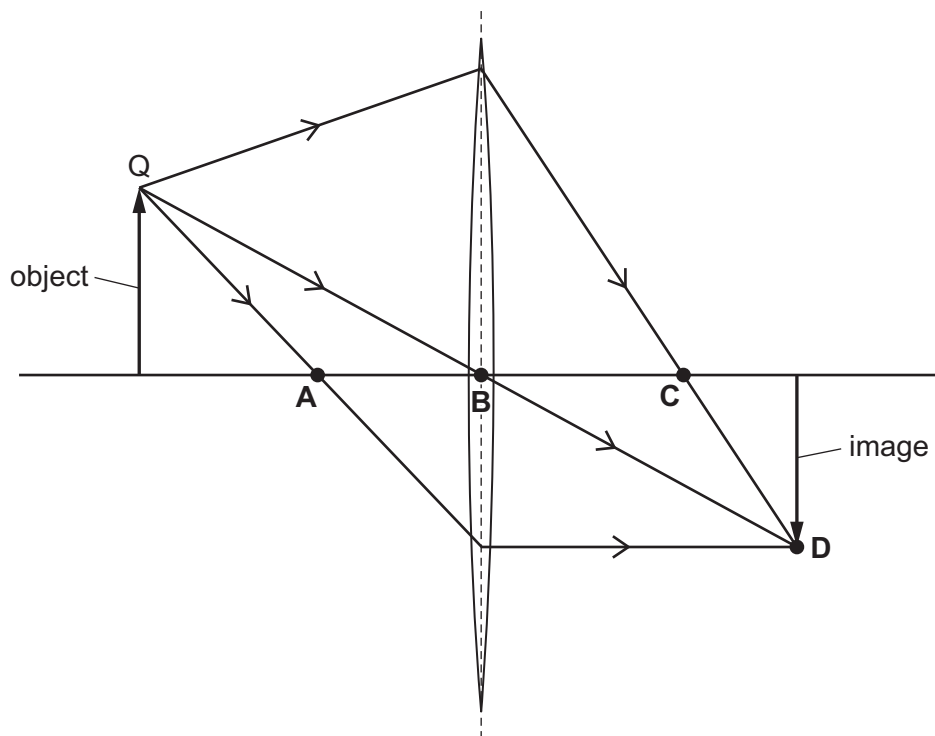


What is the angle of reflection of the ray when it is reflected from the mirror?

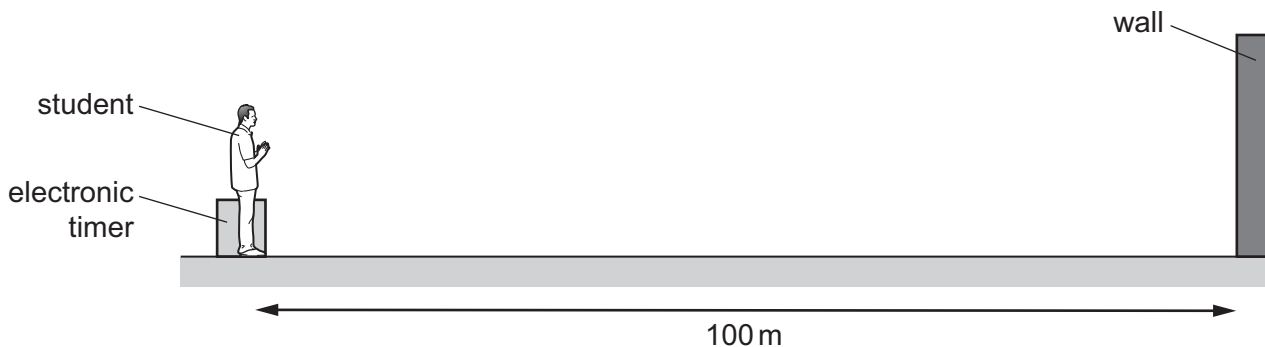
- A** 40° **B** 50° **C** 80° **D** 100°

- 36 The diagram shows three rays of light from point Q at the top of an object. The rays pass through a thin converging lens to form a real image.

Which labelled point is the principal focus of the lens?



- 37 A student measures the speed of sound. He claps his hands and the sound reflects from a wall that is 100 m away from him.

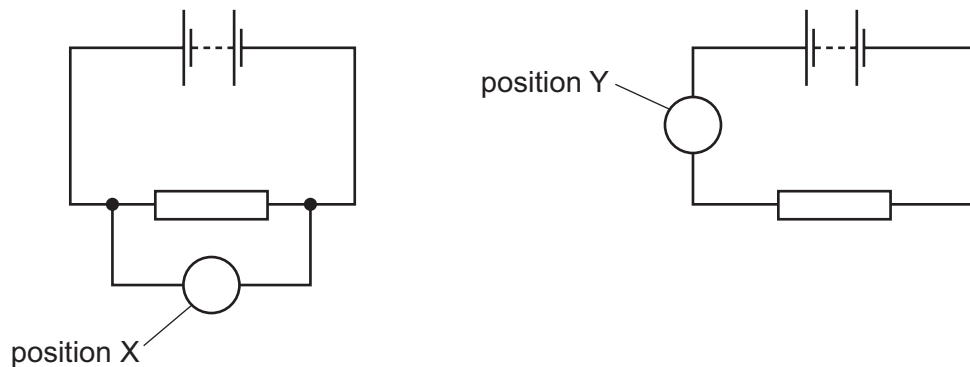


An electronic timer next to the student detects the echo of the sound 0.60 s after it is made.

Which calculation gives the speed of sound?

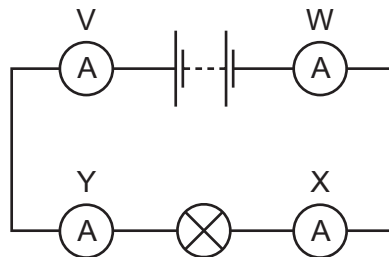
- A $\frac{200}{0.30}$ m/s B $\frac{200}{0.60}$ m/s C $\frac{100}{0.60}$ m/s D $\frac{100}{1.2}$ m/s

- 38 A student wants to measure the potential difference across a resistor. The circuits show two different positions in which a meter can be connected.



What meter is used, and where is it connected in the circuit?

- A an ammeter in position X
 - B an ammeter in position Y
 - C a voltmeter in position X
 - D a voltmeter in position Y
- 39 Four ammeters V, W, X and Y are connected in the circuit shown.



Which ammeters have the same reading as each other?

- A V and W only
 - B V and Y only
 - C X and Y only
 - D V, W, X and Y
- 40 An electrical appliance with a resistance of $60\ \Omega$ requires a voltage of $240\ \text{V}$ to operate normally.
- Which fuse is the most suitable to use to protect the appliance?
- A $0.25\ \text{A}$
 - B $1\ \text{A}$
 - C $5\ \text{A}$
 - D $13\ \text{A}$

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The Periodic Table of Elements

Group																																																																																		
I	II	Key										III	IV	V	VI	VII	VIII																																																																	
3 Li lithium 7	4 Be beryllium 9	atomic number atomic symbol name relative atomic mass										5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20																																																																	
		1 H hydrogen 1																2 He helium 4																																																																
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 —	113 Nh nihonium —	114 Fl flerovium —	115 Lv livermorium —	116 Lv livermorium —	117 Ts tennessine —

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
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 —

actinoids

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).



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A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.



1 Which characteristic of living organisms describes the taking in of materials for energy, growth and development?

- A absorption
- B nutrition
- C photosynthesis
- D respiration

2 What is osmosis?

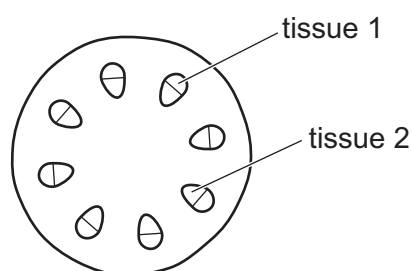
- A the movement of salt across a cell wall
- B the movement of salt across a partially permeable membrane
- C the movement of water across a cell wall
- D the movement of water across a partially permeable membrane

3 Nitrates in the soil are taken up by the roots of a plant.

What are the nitrates used to make?

- A fat
- B glucose
- C protein
- D starch

4 The diagram shows a cross section of a stem.



Which row shows the correct names and functions of the tissues?

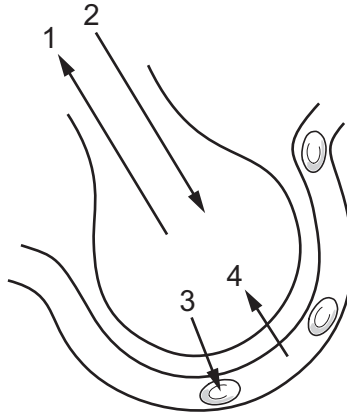
	tissue 1		tissue 2	
	name	function	name	function
A	phloem	support only	phloem	transport only
B	phloem	transport only	xylem	support and transport
C	xylem	transport only	phloem	support and transport
D	xylem	support only	xylem	transport only

5 Which statements about the site of valves are correct?

- 1 present between atria and ventricles
- 2 present between ventricles and arteries
- 3 present between arteries and lungs

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

6 The diagram shows an alveolus and a blood capillary.



Which two arrows represent gas exchange by diffusion only?

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

7 Glucose is involved in the reaction in the body shown below.



What are P, Q and R?

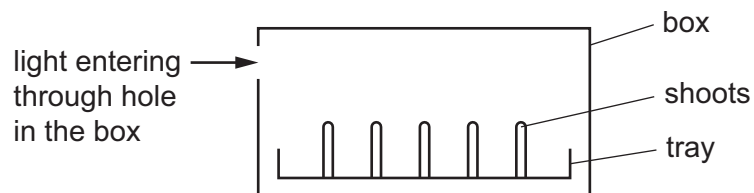
	P	Q	R
A	carbon dioxide	oxygen	water
B	carbon dioxide	water	oxygen
C	oxygen	water	carbon dioxide
D	water	carbon dioxide	oxygen

- 8 A biologist keeps a potted plant in a laboratory.

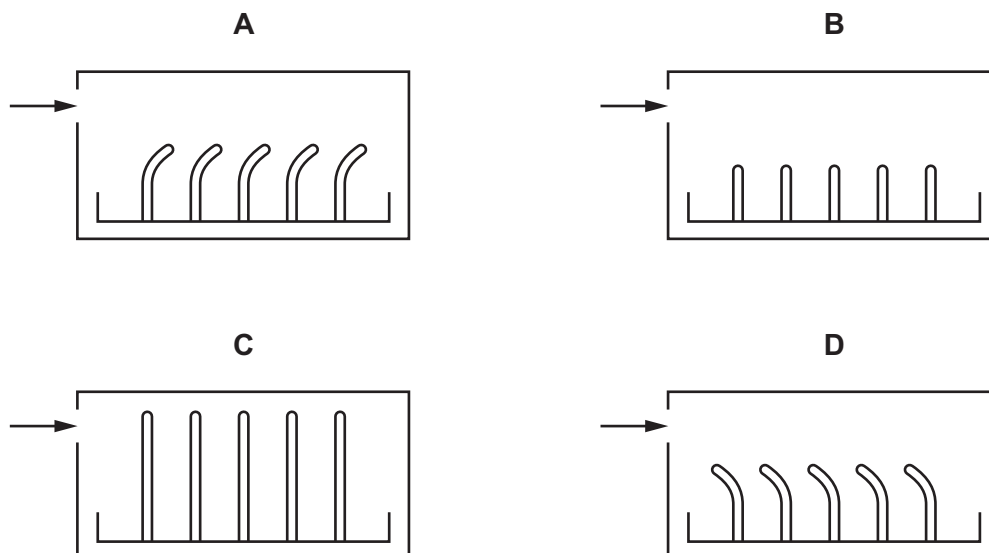
Which feature of the potted plant shows that it is a living organism?

- A It grows larger over time.
- B It has green leaves.
- C The compost in the pot dries after he waters it.
- D The stems contain xylem.

- 9 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?



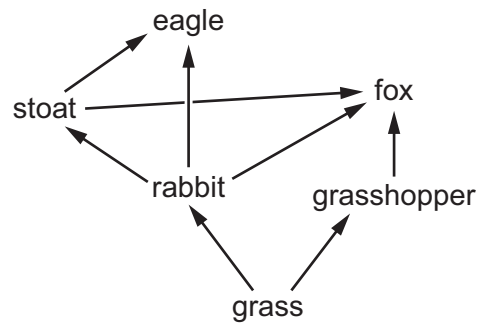
- 10 Which statement about sexual reproduction is **always** correct?

- A It involves only one parent.
- B It involves the fusion of nuclei.
- C It produces genetically identical offspring.
- D It takes place only in animals.

11 What is the function of the human ovaries?

- A place where the fetus develops
- B release of eggs
- C site of fertilisation
- D transfer of egg to the uterus

12 The diagram shows a food web.



Which statement about this food web is correct?

- A It has five carnivores.
- B It has five consumers.
- C It has one herbivore.
- D It has two producers.

13 Which row shows the effects of deforestation?

	amount of photosynthesis	concentration of carbon dioxide in atmosphere
A	less	more
B	less	less
C	more	less
D	more	more

14 Four changes are listed.

- 1 solid carbon dioxide → carbon dioxide gas
- 2 the rusting of iron
- 3 the electrolysis of molten sodium chloride
- 4 the fractional distillation of crude oil

Which row identifies the chemical changes and physical changes?

	chemical change	physical change
A	1 and 2	3 and 4
B	1 and 4	2 and 3
C	2 and 3	1 and 4
D	3 and 4	1 and 2

15 A white solid X is formed when magnesium reacts with oxygen.

What is X?

- A** a compound
- B** a mixture
- C** an alloy
- D** an element

16 Which row describes the fluorine atom, $^{19}_{9}\text{F}$?

	number of protons	number of neutrons	number of electrons
A	9	9	10
B	9	10	9
C	10	9	10
D	10	19	9

- 17 The fertiliser ammonium sulfate has the formula $(\text{NH}_4)_2\text{SO}_4$.

How many atoms of each element are present in the formula?

	number of hydrogen atoms	number of nitrogen atoms	number of oxygen atoms	number of sulfur atoms
A	4	1	1	1
B	4	2	4	1
C	8	1	4	1
D	8	2	4	1

- 18 Element X is a non-metal used in the treatment of the water supply.

It is made during the electrolysis of a metal salt.

What is the colour of X and at which electrode is it made?

	colour	electrode
A	red	anode
B	red	cathode
C	yellow-green	anode
D	yellow-green	cathode

- 19 The initial and the final temperatures of four different reactions are recorded.

Which reaction is the **most** exothermic?

	initial temperature / °C	final temperature / °C
A	19	16
B	20	19
C	22	24
D	24	25

20 Limestone chips react with dilute hydrochloric acid.

Which change decreases the speed of the reaction?

- A** adding a catalyst
- B** decreasing the temperature
- C** increasing the concentration of hydrochloric acid
- D** using limestone powder

21 What are the products of the reaction between dilute hydrochloric acid and copper carbonate?

- A** copper chloride + carbon dioxide + water
- B** copper chloride + hydrogen carbonate
- C** copper oxide + carbon dioxide + water
- D** copper oxide + chlorine + water

22 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the group number that includes elements X and Y and which element is lighter in colour?

	group number	lighter in colour
A	I	X
B	I	Y
C	VII	X
D	VII	Y

23 Which row describes the reactivity and the electronic structure of a noble gas?

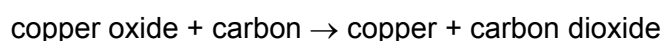
	reactivity	electronic structure
A	reactive	full outer shell
B	reactive	incomplete outer shell
C	unreactive	incomplete outer shell
D	unreactive	full outer shell

24 Which statement about alloys is correct?

- A They are made from metals because metals are poor electrical conductors.
- B They are mixtures of compounds that contain metals.
- C They have all the same properties as the metals from which they are made.
- D They have different properties to the metals from which they are made.

25 Copper oxide reacts with carbon.

The equation is shown.



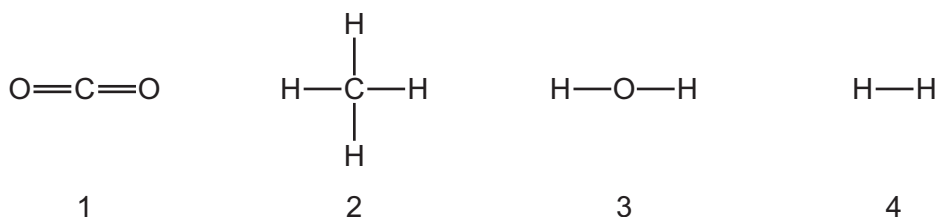
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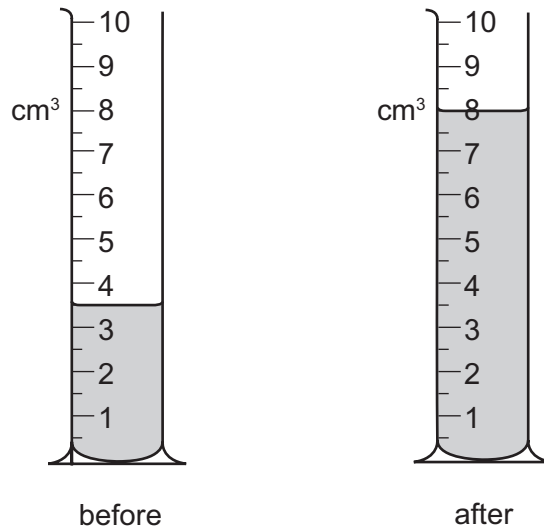


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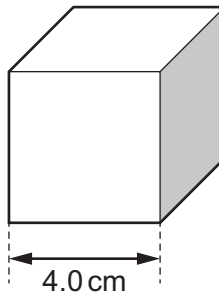
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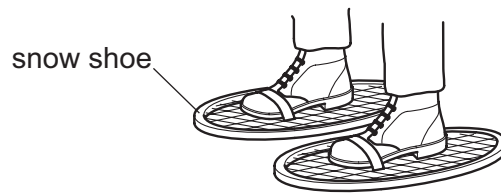
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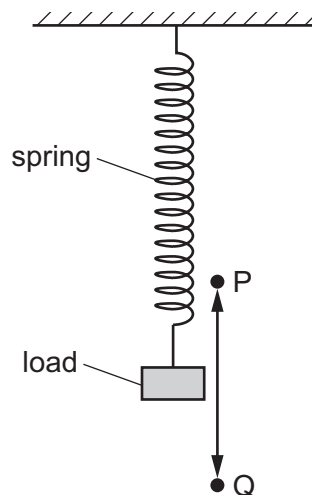
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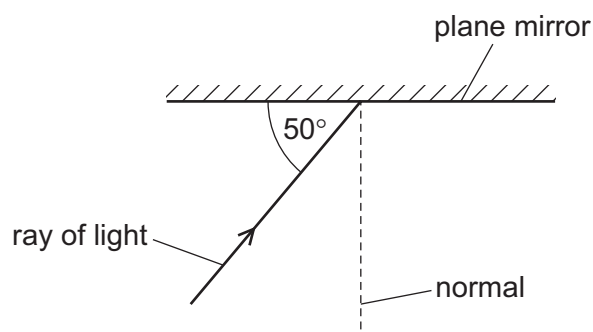
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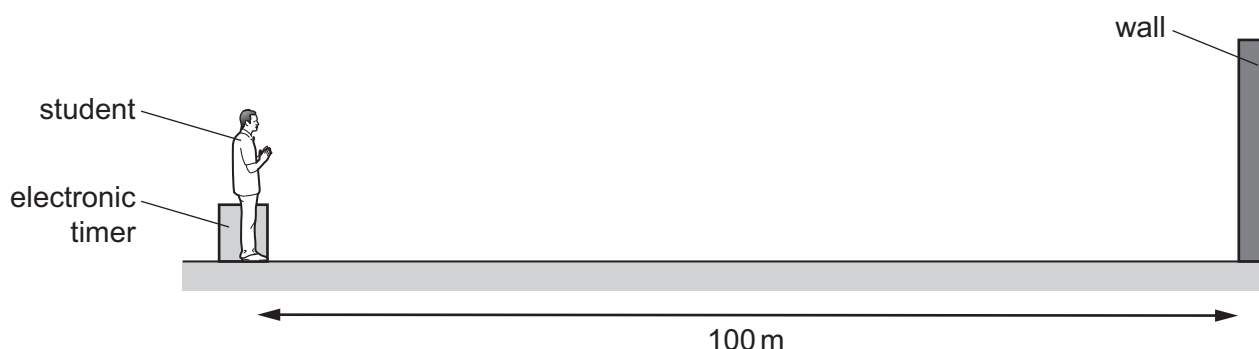
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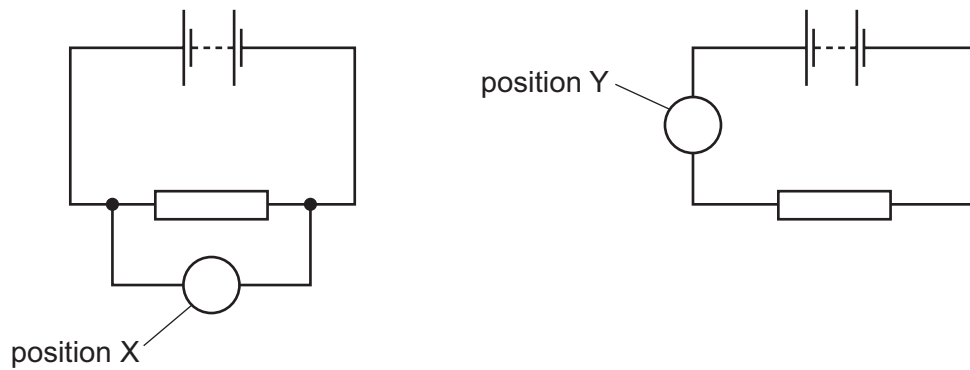
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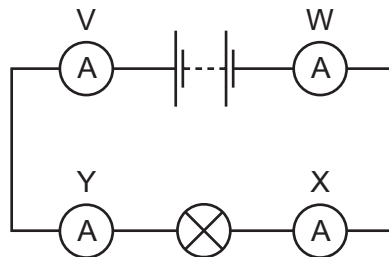
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What meter is used, and where is it connected in the circuit?

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The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	VIII
		Key atomic number atomic symbol name relative atomic mass															
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											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											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										76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204
87 Fr francium —	88 Ra radium —	89–103 actinoids										108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —

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.).



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/13

October/November 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.

This document consists of **15** printed pages and **1** blank page.

1 Which characteristic of living organisms describes the taking in of materials for energy, growth and development?

- A absorption
- B nutrition
- C photosynthesis
- D respiration

2 What is osmosis?

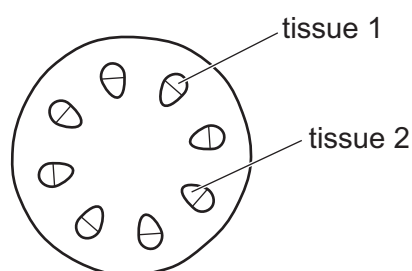
- A the movement of salt across a cell wall
- B the movement of salt across a partially permeable membrane
- C the movement of water across a cell wall
- D the movement of water across a partially permeable membrane

3 Nitrates in the soil are taken up by the roots of a plant.

What are the nitrates used to make?

- A fat
- B glucose
- C protein
- D starch

4 The diagram shows a cross section of a stem.



Which row shows the correct names and functions of the tissues?

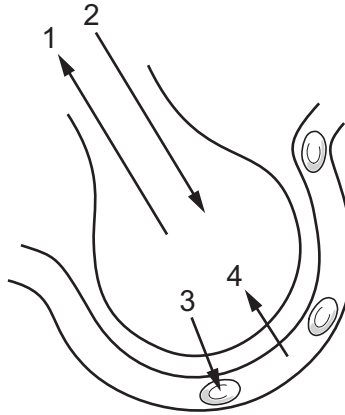
	tissue 1		tissue 2	
	name	function	name	function
A	phloem	support only	phloem	transport only
B	phloem	transport only	xylem	support and transport
C	xylem	transport only	phloem	support and transport
D	xylem	support only	xylem	transport only

5 Which statements about the site of valves are correct?

- 1 present between atria and ventricles
- 2 present between ventricles and arteries
- 3 present between arteries and lungs

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

6 The diagram shows an alveolus and a blood capillary.



Which two arrows represent gas exchange by diffusion only?

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

7 Glucose is involved in the reaction in the body shown below.



What are P, Q and R?

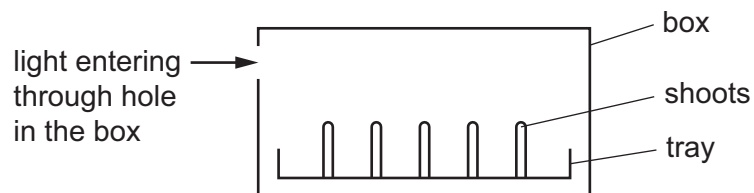
	P	Q	R
A	carbon dioxide	oxygen	water
B	carbon dioxide	water	oxygen
C	oxygen	water	carbon dioxide
D	water	carbon dioxide	oxygen

- 8 A biologist keeps a potted plant in a laboratory.

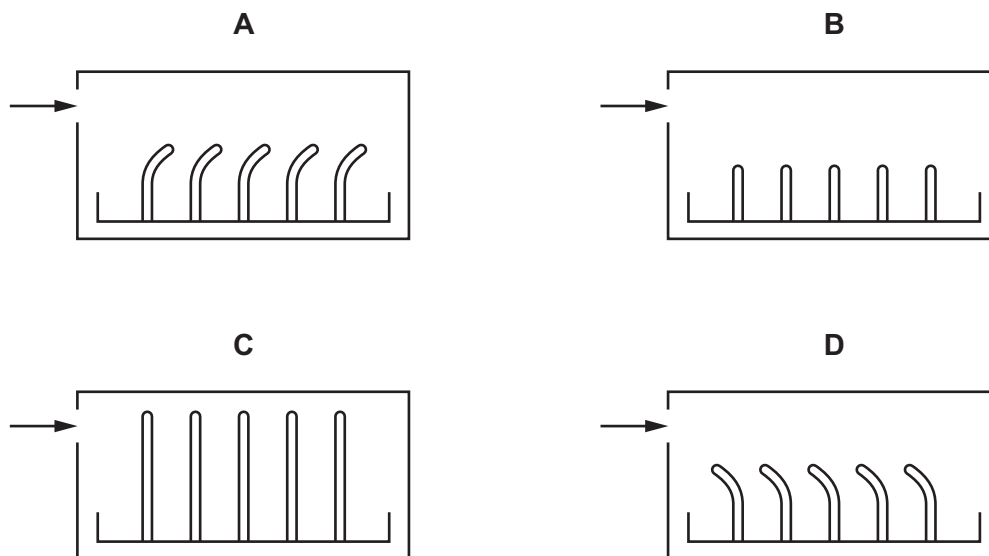
Which feature of the potted plant shows that it is a living organism?

- A It grows larger over time.
- B It has green leaves.
- C The compost in the pot dries after he waters it.
- D The stems contain xylem.

- 9 The diagram shows the shoots of a tray of seedlings in a box. Light enters the box as shown.



Which diagram shows the phototropic response of the shoots after 48 hours?



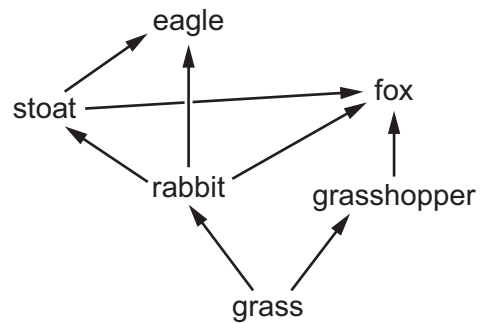
- 10 Which statement about sexual reproduction is **always** correct?

- A It involves only one parent.
- B It involves the fusion of nuclei.
- C It produces genetically identical offspring.
- D It takes place only in animals.

11 What is the function of the human ovaries?

- A place where the fetus develops
- B release of eggs
- C site of fertilisation
- D transfer of egg to the uterus

12 The diagram shows a food web.



Which statement about this food web is correct?

- A It has five carnivores.
- B It has five consumers.
- C It has one herbivore.
- D It has two producers.

13 Which row shows the effects of deforestation?

	amount of photosynthesis	concentration of carbon dioxide in atmosphere
A	less	more
B	less	less
C	more	less
D	more	more

14 Four changes are listed.

- 1 solid carbon dioxide → carbon dioxide gas
- 2 the rusting of iron
- 3 the electrolysis of molten sodium chloride
- 4 the fractional distillation of crude oil

Which row identifies the chemical changes and physical changes?

	chemical change	physical change
A	1 and 2	3 and 4
B	1 and 4	2 and 3
C	2 and 3	1 and 4
D	3 and 4	1 and 2

15 A white solid X is formed when magnesium reacts with oxygen.

What is X?

- A** a compound
- B** a mixture
- C** an alloy
- D** an element

16 Which row describes the fluorine atom, $^{19}_{9}\text{F}$?

	number of protons	number of neutrons	number of electrons
A	9	9	10
B	9	10	9
C	10	9	10
D	10	19	9

- 17 The fertiliser ammonium sulfate has the formula $(\text{NH}_4)_2\text{SO}_4$.

How many atoms of each element are present in the formula?

	number of hydrogen atoms	number of nitrogen atoms	number of oxygen atoms	number of sulfur atoms
A	4	1	1	1
B	4	2	4	1
C	8	1	4	1
D	8	2	4	1

- 18 Element X is a non-metal used in the treatment of the water supply.

It is made during the electrolysis of a metal salt.

What is the colour of X and at which electrode is it made?

	colour	electrode
A	red	anode
B	red	cathode
C	yellow-green	anode
D	yellow-green	cathode

- 19 The initial and the final temperatures of four different reactions are recorded.

Which reaction is the **most** exothermic?

	initial temperature / °C	final temperature / °C
A	19	16
B	20	19
C	22	24
D	24	25

20 Limestone chips react with dilute hydrochloric acid.

Which change decreases the speed of the reaction?

- A** adding a catalyst
- B** decreasing the temperature
- C** increasing the concentration of hydrochloric acid
- D** using limestone powder

21 What are the products of the reaction between dilute hydrochloric acid and copper carbonate?

- A** copper chloride + carbon dioxide + water
- B** copper chloride + hydrogen carbonate
- C** copper oxide + carbon dioxide + water
- D** copper oxide + chlorine + water

22 Two non-metallic elements, X and Y, are in the same group of the Periodic Table.

X is higher in the group than Y.

Which row shows the group number that includes elements X and Y and which element is lighter in colour?

	group number	lighter in colour
A	I	X
B	I	Y
C	VII	X
D	VII	Y

23 Which row describes the reactivity and the electronic structure of a noble gas?

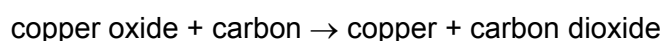
	reactivity	electronic structure
A	reactive	full outer shell
B	reactive	incomplete outer shell
C	unreactive	incomplete outer shell
D	unreactive	full outer shell

24 Which statement about alloys is correct?

- A They are made from metals because metals are poor electrical conductors.
- B They are mixtures of compounds that contain metals.
- C They have all the same properties as the metals from which they are made.
- D They have different properties to the metals from which they are made.

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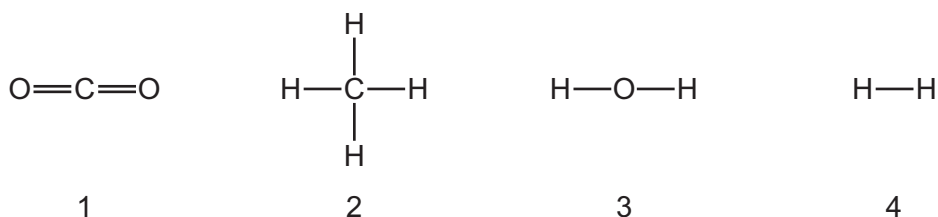
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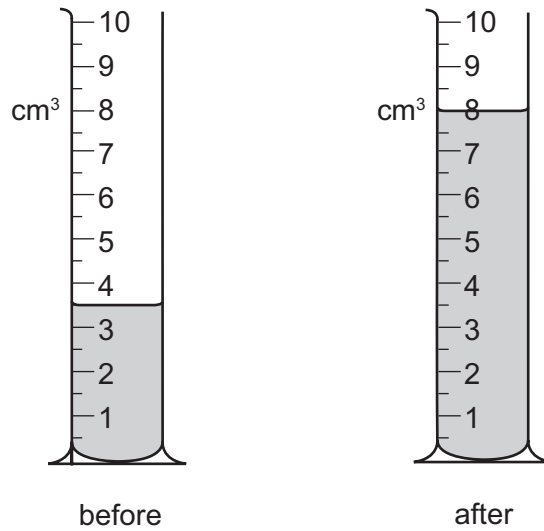


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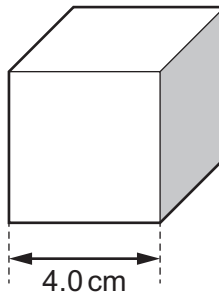
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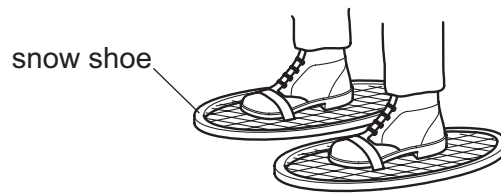
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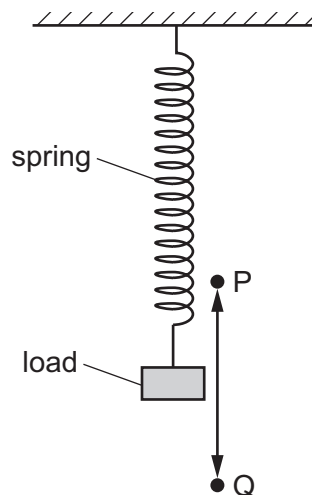
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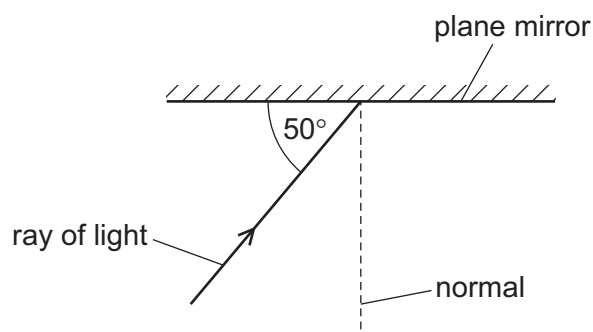
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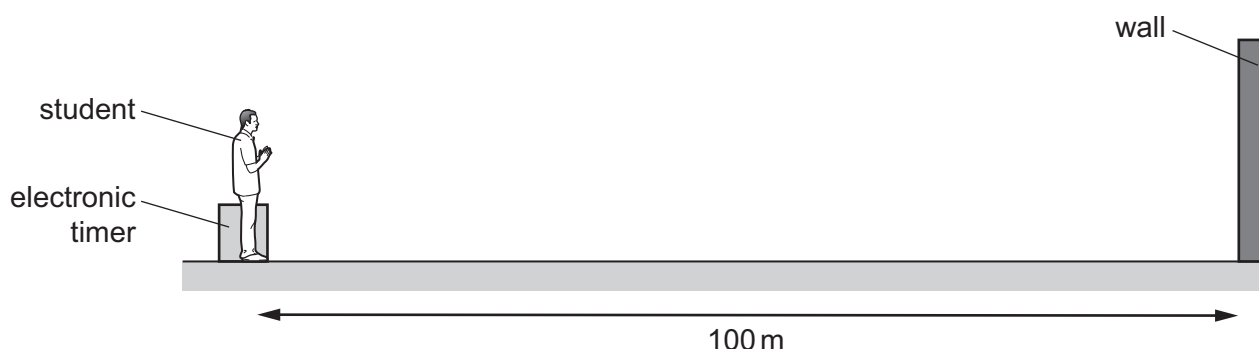
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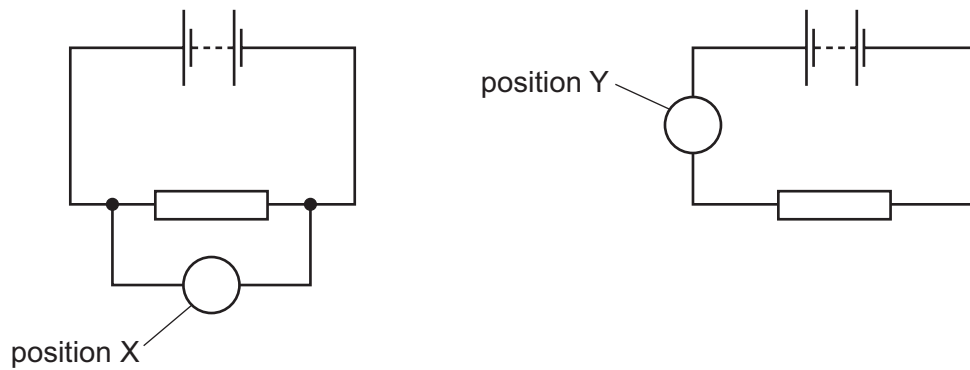
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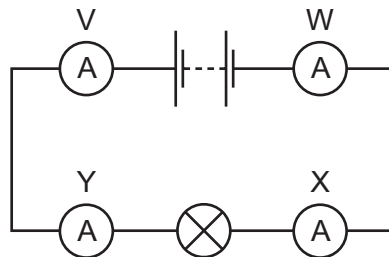
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19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 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 —	117 Ts tennessine —	118 Og oganesson —	119 Og oganesson —	120 Og oganesson —

lanthanoids

actinoids

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
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 dm³ at room temperature and pressure (r.t.p.).