



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/11

May/June 2019

45 minutes

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

* 5 1 1 3 4 2 6 9 2 0 *



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Write in soft pencil.

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Write your name, centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.

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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 **16** printed pages.



1 Which characteristics are found in all living organisms?

	excretion	growth	photosynthesis	respiration
A	yes	yes	no	yes
B	yes	yes	yes	no
C	yes	no	yes	yes
D	no	yes	yes	yes

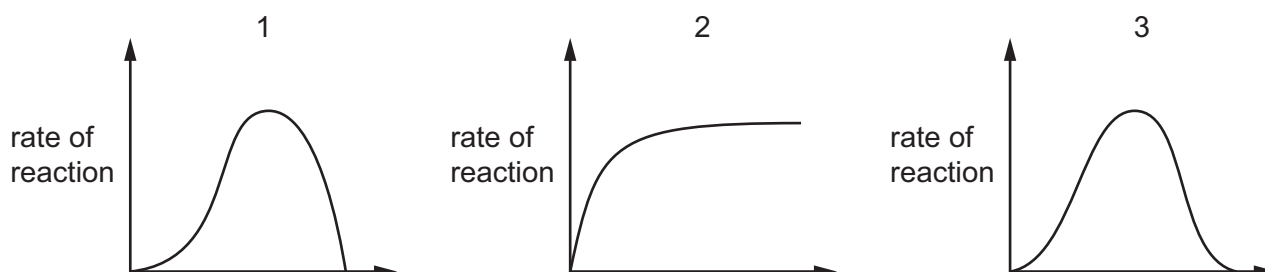
2 Uncooked pieces of potato of identical size were placed in different liquids for one hour.

- 1 pure water
- 2 sugar solution less concentrated than the cell contents
- 3 sugar solution more concentrated than the cell contents
- 4 sugar solution of the same concentration as the cell contents

After this time, which liquids will cause an increase in the size of the pieces of potato?

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

3 Which row identifies the graphs that show the effect of temperature and the effect of pH on an enzyme-controlled reaction?



	temperature	pH
A	graph 1	graph 2
B	graph 2	graph 3
C	graph 1	graph 3
D	graph 3	graph 2

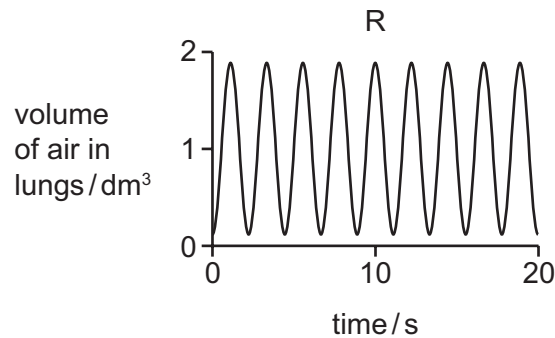
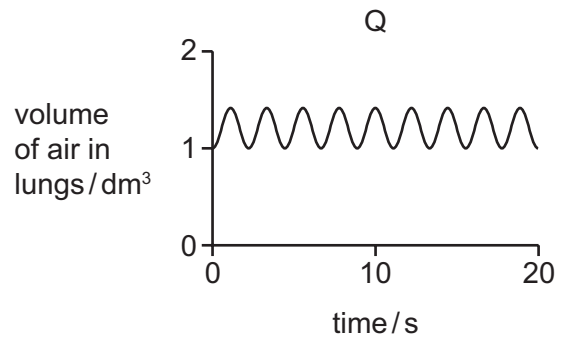
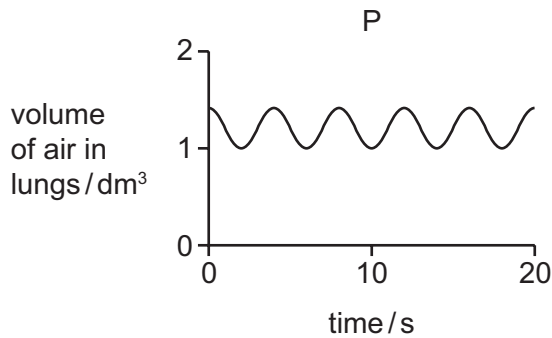
4 What helps maintain healthy gums?

- A** calcium
- B** iron
- C** vitamin C
- D** vitamin D

5 What is a function of the small intestine?

- A It cuts food into small pieces.
- B It provides a large surface area for absorption.
- C It provides space for the storage of faeces.
- D It stores food.

6 The graphs P, Q and R show the changes in the volume of air in the lungs of the same person, measured after different levels of activities.



Which row shows the correct graph for each level of activity?

	at rest	immediately after 10 minutes of running	immediately after 10 minutes of walking
A	P	Q	R
B	P	R	Q
C	R	Q	P
D	R	P	Q

7 Which word equation represents aerobic respiration?

A carbon dioxide + glucose → oxygen + water

B glucose + oxygen → carbon dioxide + water

C oxygen + water → carbon dioxide + glucose

D water + carbon dioxide → glucose + oxygen

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 growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

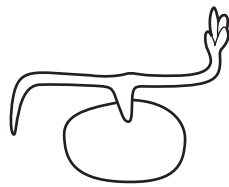


diagram 1

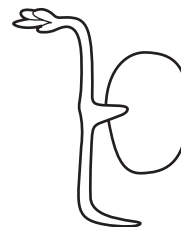


diagram 2

What is the shape of the seedling three days later?

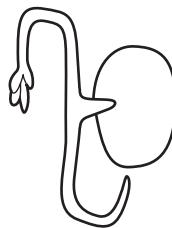
A



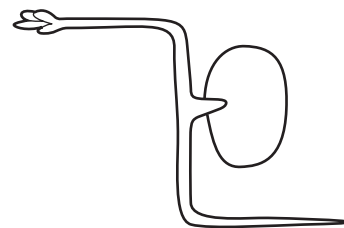
B



C



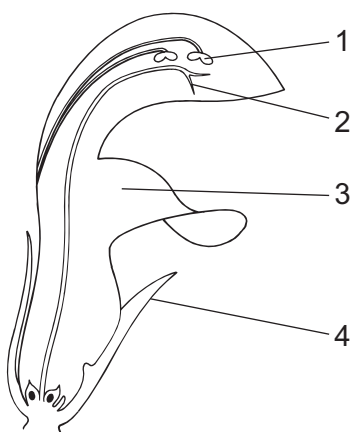
D



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

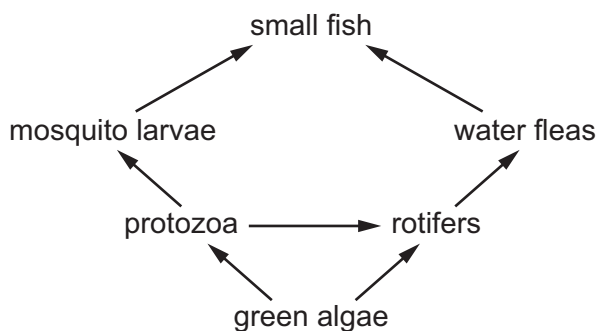
11 The diagram shows a section through an insect-pollinated flower.



Which labels are correct?

	anther	petal	sepal	stigma
A	1	3	4	2
B	1	4	3	2
C	2	3	4	1
D	2	4	3	1

12 The diagram shows a food web.



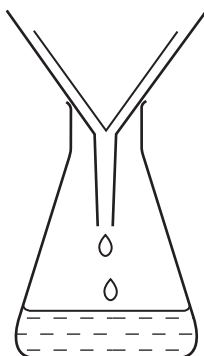
Which organisms are both primary and secondary consumers?

- A small fish only
- B protozoa and rotifers
- C protozoa only
- D rotifers only

13 Which gas builds up in the atmosphere as a result of deforestation?

- A carbon dioxide
- B methane
- C nitrogen
- D oxygen

14 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.

15 Copper sulfate crystals dissolve in water.

Which word describes the role of the water?

- A** filtrate
- B** solute
- C** solution
- D** solvent

16 Which row describes an ionic compound?

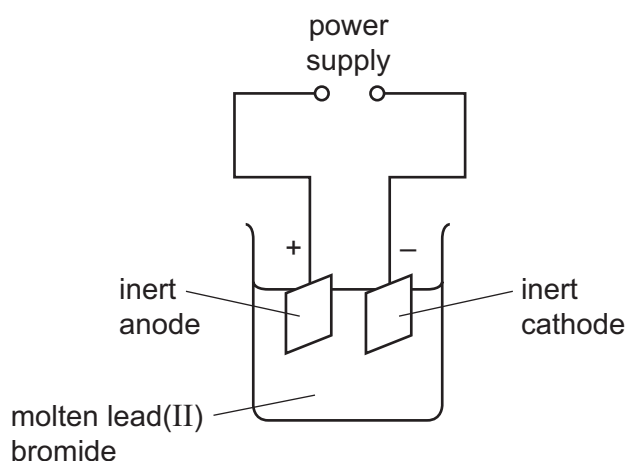
	melting point / °C	electrical conductivity when solid	electrical conductivity when dissolved in water
A	−7	poor	good
B	119	poor	insoluble
C	801	poor	good
D	3652	good	insoluble

17 Aluminium sulfate contains two aluminium atoms, three sulfur atoms and twelve oxygen atoms.

What is the formula of aluminium sulfate?

- A** $2Al_3S_6O$ **B** $2AlS_3O_{12}$ **C** $Al_2(SO_4)_3$ **D** $Al_23(SO_4)$

18 Molten lead(II) bromide is electrolysed using inert electrodes.



What is formed at each electrode?

	anode	cathode
A	grey solid	orange-brown gas
B	grey solid	grey solid
C	orange-brown gas	orange-brown gas
D	orange-brown gas	grey solid

19 When an excess of zinc is added to dilute hydrochloric acid, a gas is released.

Which pieces of apparatus are needed to investigate the rate of this reaction?

- 1 balance
- 2 gas syringe
- 3 stop watch
- 4 thermometer

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

- 20 Methane reacts with copper oxide.

The equation for the reaction is shown.



Which statement about this reaction is correct?

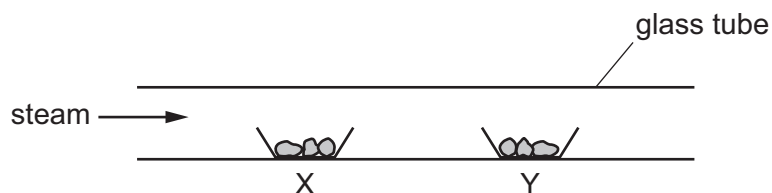
- A** Carbon is reduced.
B Copper oxide is oxidised.
C It is a redox reaction.
D Methane is reduced.
- 21 Which aqueous ion gives a white precipitate with aqueous sodium hydroxide and with aqueous ammonia?
- A** Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}
- 22 Which row describes the physical state of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

- 23 Which gas is used to fill lamps?
- A** argon
B carbon dioxide
C hydrogen
D oxygen
- 24 Which two elements do **not** form an alloy?
- A** carbon and sulfur
B carbon and iron
C copper and zinc
D silver and gold

- 25 Two open containers, X and Y, are inside a glass tube.

Steam passes over solids in X and Y, as shown.



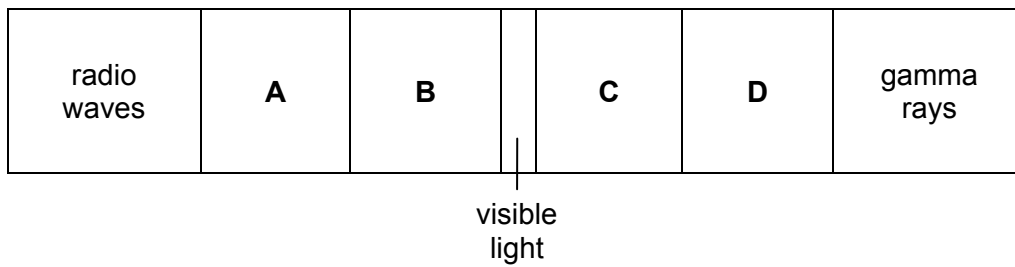
X contains anhydrous copper(II) sulfate.

Y contains hydrated cobalt(II) chloride.

What is observed?

- A The solid in X remains blue.
 - B The solid in X turns from white to blue.
 - C The solid in Y turns from blue to pink.
 - D The solid in Y turns from pink to white.
- 26 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.
- 27 Which statement about alkanes is **not** correct?
- A Alkanes are unsaturated hydrocarbons.
 - B Alkanes burn to release heat energy.
 - C Alkanes form carbon dioxide and water when they burn.
 - D Alkane molecules contain only single bonds.

- 28 Which labelled part of the electromagnetic spectrum is often involved in thermal energy transfer by radiation?

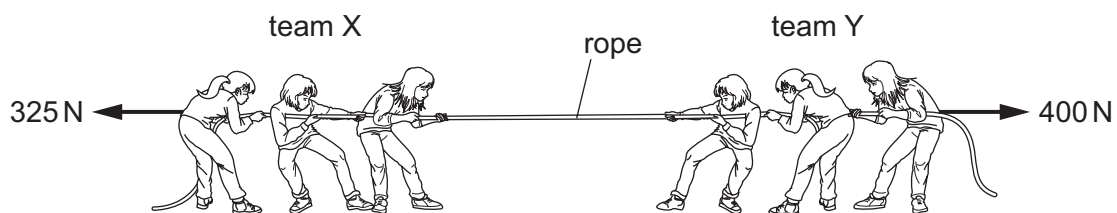


- 29 What does the gradient of a speed–time graph represent?

- A acceleration
B average speed
C distance travelled
D time taken

- 30 The diagram shows a tug-of-war between team X and team Y.

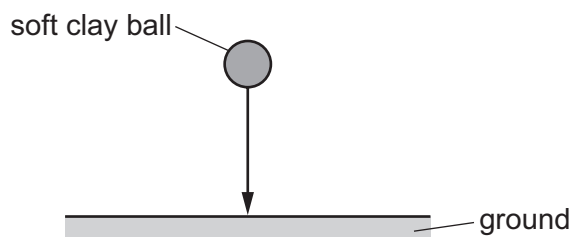
The arrows show the forces exerted by the teams on the rope.



What is the size of the resultant force on the rope and in which direction does the resultant force act?

	size of resultant force / N	direction of resultant force
A	75	to the left
B	75	to the right
C	725	to the left
D	725	to the right

- 31 A ball made of soft clay is dropped and hits the ground. It does not bounce.



What energy changes take place as the ball drops and hits the ground?

- A** gravitational potential $\rightarrow$ kinetic $\rightarrow$ thermal
B gravitational potential $\rightarrow$ thermal $\rightarrow$ kinetic
C kinetic $\rightarrow$ gravitational potential $\rightarrow$ thermal
D kinetic $\rightarrow$ thermal $\rightarrow$ gravitational potential
- 32 Which two quantities are used to calculate the power produced by a car engine?
- A** the speed of the car and the distance the car has travelled
B the speed of the car and the time for the journey
C the work done by the engine and the distance the car has travelled
D the work done by the engine and the time taken to do the work
- 33 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

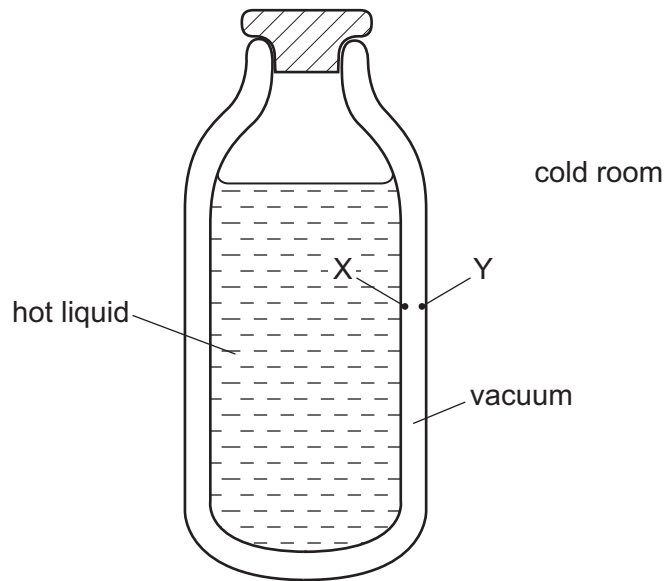
	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

- A** 0°C **B** 50°C **C** 90°C **D** 300°C

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

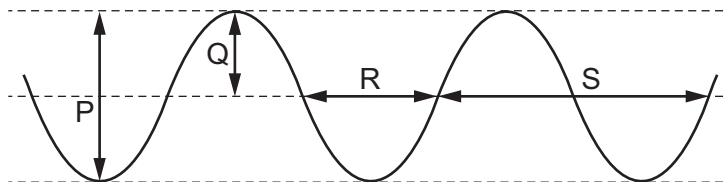
X and Y are points on the inside surfaces of the walls of the flask.



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

35 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

36 Which row describes the characteristics of the image of an object formed by a plane mirror?

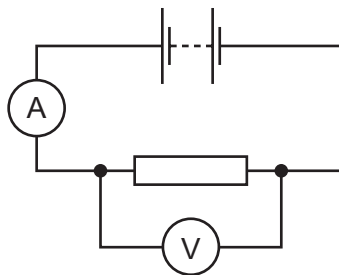
	type of image	size of image
A	real	same as object
B	real	smaller than object
C	virtual	same as object
D	virtual	smaller than object

37 The amplitude of a sound wave decreases and its frequency increases.

What happens to the sound heard?

- A** It becomes louder and its pitch becomes higher.
- B** It becomes louder and its pitch becomes lower.
- C** It becomes quieter and its pitch becomes higher.
- D** It becomes quieter and its pitch becomes lower.

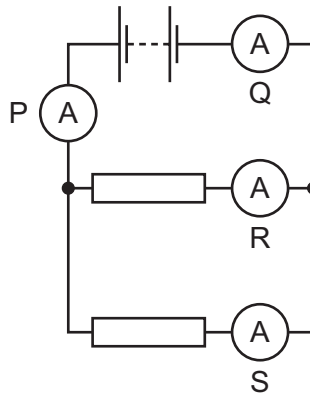
38 The diagram shows a circuit set up by a student.



How is the resistance of the resistor calculated?

- A** $\frac{\text{ammeter reading}}{\text{voltmeter reading}}$
- B** ammeter reading $\times$ voltmeter reading
- C** $\frac{\text{voltmeter reading}}{\text{ammeter reading}}$
- D** voltmeter reading + ammeter reading

- 39 A circuit contains four ammeters P, Q, R and S.



Which of these ammeters show the greatest reading?

- A** P only **B** P and Q **C** R only **D** R and S
- 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	Key										III	IV	V	VI	VII	VIII	
		1 Hhydrogen1																
		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	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 —	—	—	—	—	

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

- 1 What are the outermost layers 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 What is a definition of the net movement of molecules by diffusion?

- A** movement down a concentration gradient from a higher to lower concentration
- B** movement down a concentration gradient from a lower to higher concentration
- C** movement up a concentration gradient from a higher to lower concentration
- D** movement up a concentration gradient from a lower to higher concentration

- 3 Which row shows the elements contained in a fat molecule?

	carbon	hydrogen	nitrogen	oxygen
A	✓	✓	✓	✓
B	✓	x	✓	x
C	✓	✓	x	✓
D	x	✓	✓	✓

- 4 Which two components of cow's milk are essential for strong teeth and bones?

- A** minerals and vitamins
- B** fats and proteins
- C** carbohydrates and vitamins
- D** minerals and water

- 5 What is a function of the small intestine?

- A** It cuts food into small pieces.
- B** It provides a large surface area for absorption.
- C** It provides space for the storage of faeces.
- D** It stores food.

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

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

	blood glucose concentration	pulse rate
A	decreases	decreases
B	decreases	increases
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8 Diagram 1 shows a growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

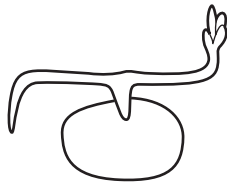


diagram 1

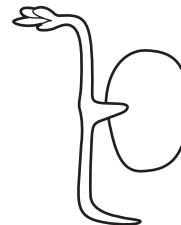


diagram 2

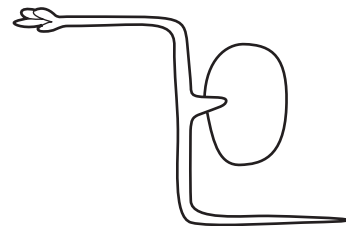
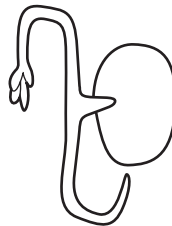
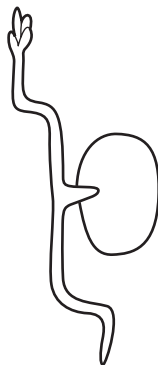
What is the shape of the seedling three days later?

A

B

C

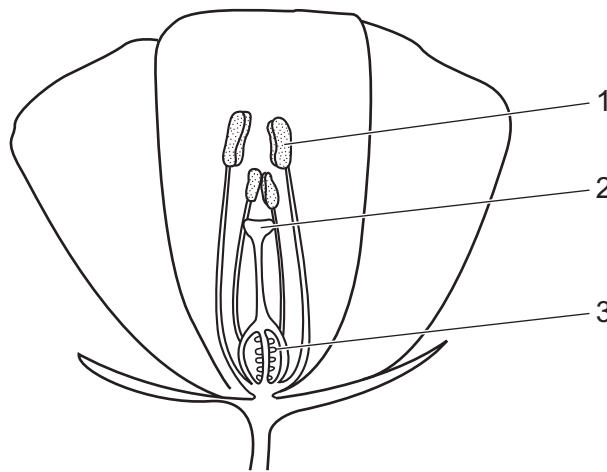
D



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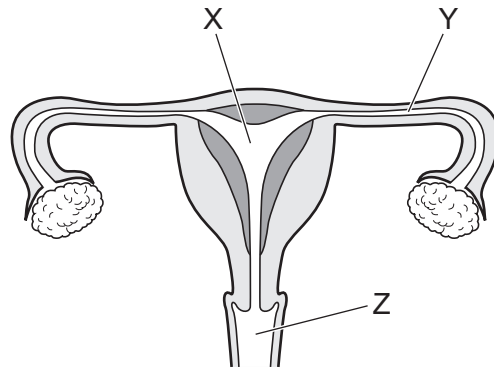
10 The diagram shows half a flower.



Where are the female and male gametes made?

	female	male
A	1	2
B	1	3
C	2	1
D	3	1

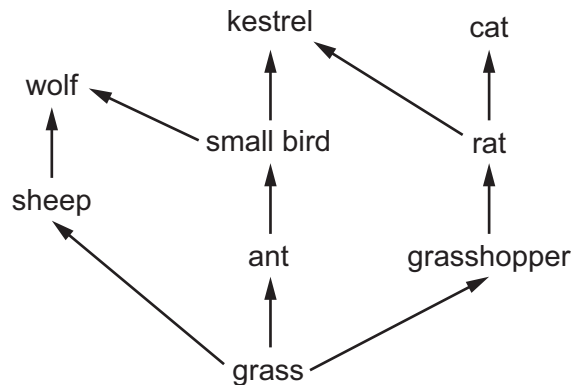
11 The diagram shows the female reproductive system.



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

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

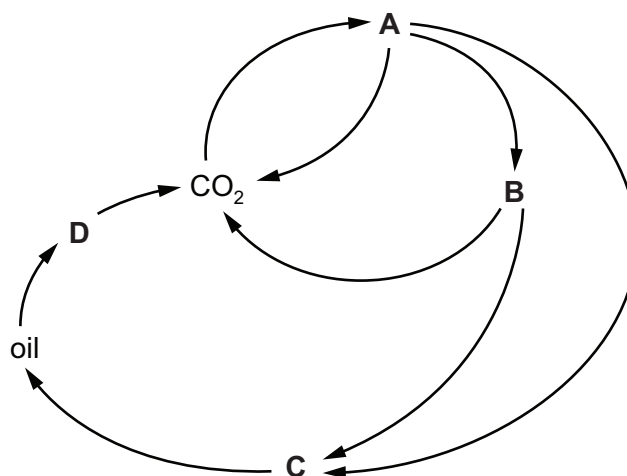


How many different food chains are there in the food web shown?

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

13 The diagram represents the carbon cycle.

Which letter represents combustion?



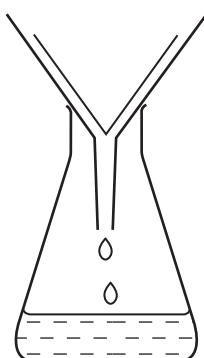
14 A molecule of hydrogen has the formula H_2 .

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.



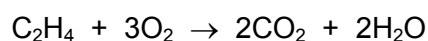
Why can sugar and salt **not** be separated by using this apparatus?

- 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 Which row about each substance is correct?

	substance	type of bonding	description of bonds	other information
A	ammonia	covalent	three shared pairs of electrons	all atoms have full outer electron shells
B	lithium fluoride	covalent	one shared pair of electrons	both atoms have noble gas electronic structure
C	potassium iodide	ionic	electron transfer from potassium to iodine	volatile compound
D	water	ionic	electron transfer from hydrogen to oxygen	non-volatile compound

17 The equation for the combustion of ethene is shown.



Which statement about this reaction is **not** correct?

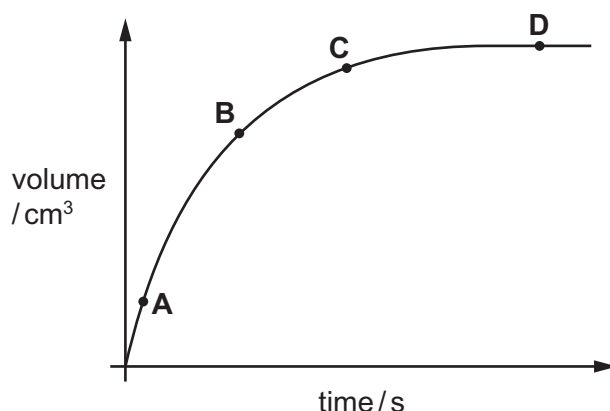
- A** More oxygen molecules than ethene molecules are used.
- B** The number of carbon dioxide molecules formed is equal to the number of water molecules formed.
- C** The number of carbon dioxide molecules formed is the same as the number of ethene molecules used.
- D** The total number of molecules formed is the same as the total number of molecules used.

18 Which row identifies the products of electrolysis for the named electrolyte?

	electrolyte	product at anode	product at cathode
A	concentrated aqueous sodium chloride	chlorine	sodium
B	dilute sulfuric acid	hydrogen	oxygen
C	dilute sulfuric acid	sulfur dioxide	hydrogen
D	molten lead(II) bromide	bromine	lead

- 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 The equations for two redox reactions are shown.



Which row is correct?

	substance being reduced in reaction 1	substance being oxidised in reaction 2
A	CuO	C
B	CO	CO ₂
C	CO	C
D	CuO	CO ₂

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

A Cu²⁺ **B** Fe²⁺ **C** Fe³⁺ **D** Zn²⁺

- 22 Which row describes the physical state of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

23 Which two elements do **not** form an alloy?

- A carbon and sulfur
- B carbon and iron
- C copper and zinc
- D silver and gold

24 Part of the reactivity series is shown.

Ca	most reactive
Mg	
Al	
Zn	
Fe	least reactive



Which metals can be produced by reduction of their oxide using carbon?

- A calcium and magnesium
- B magnesium and aluminium
- C aluminium and zinc
- D zinc and iron

25 Which gas is a greenhouse gas?

- A argon
- B carbon monoxide
- C methane
- D nitrogen

26 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.

27 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.

28 A vehicle is taken from the Earth to the Moon where the gravitational field strength is weaker.

How do the mass and the weight of the vehicle on the Moon compare with their values on the Earth?

- A smaller mass and smaller weight
- B smaller mass and the same weight
- C the same mass and smaller weight
- D the same mass and the same weight

29 Two properties of a gas are its mass and its volume.

Which properties can be changed by a force?

	mass	volume
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key

✓ = can be changed

x = cannot be changed

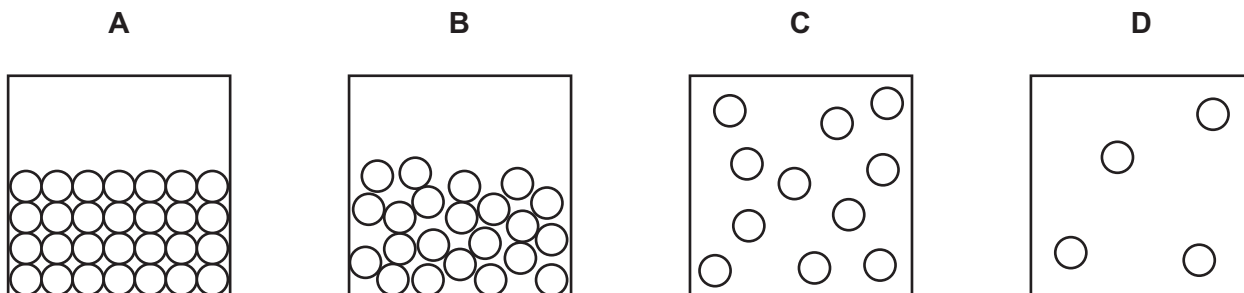
30 What energy does an object have because of its position above the surface of the Earth?

- A chemical potential
- B gravitational potential
- C kinetic
- D thermal

31 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

32 Which diagram shows the molecular structure of a liquid?



33 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

- A** 0°C **B** 50°C **C** 90°C **D** 300°C

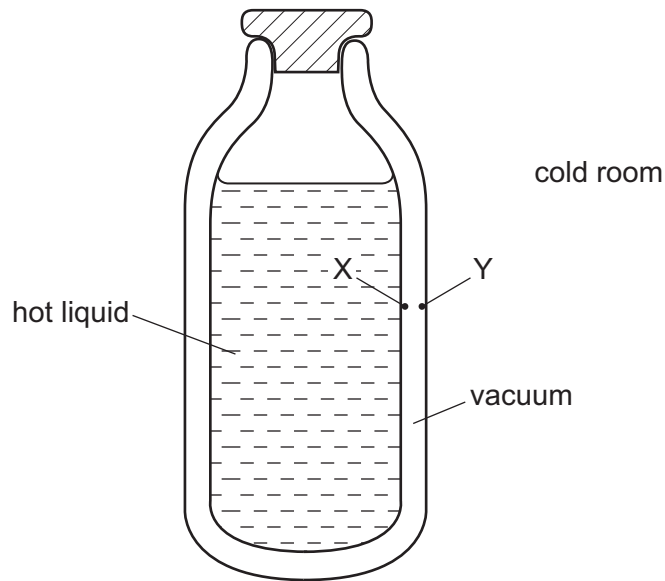
34 A solid is heated.

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

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

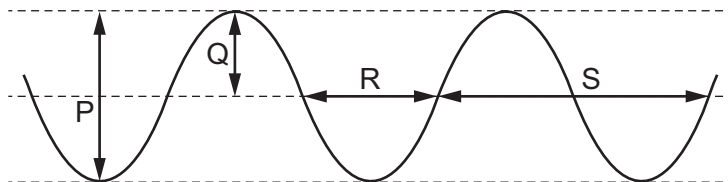
X and Y are points on the inside surfaces of the walls of the flask.



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

36 The diagram represents a wave at one moment.

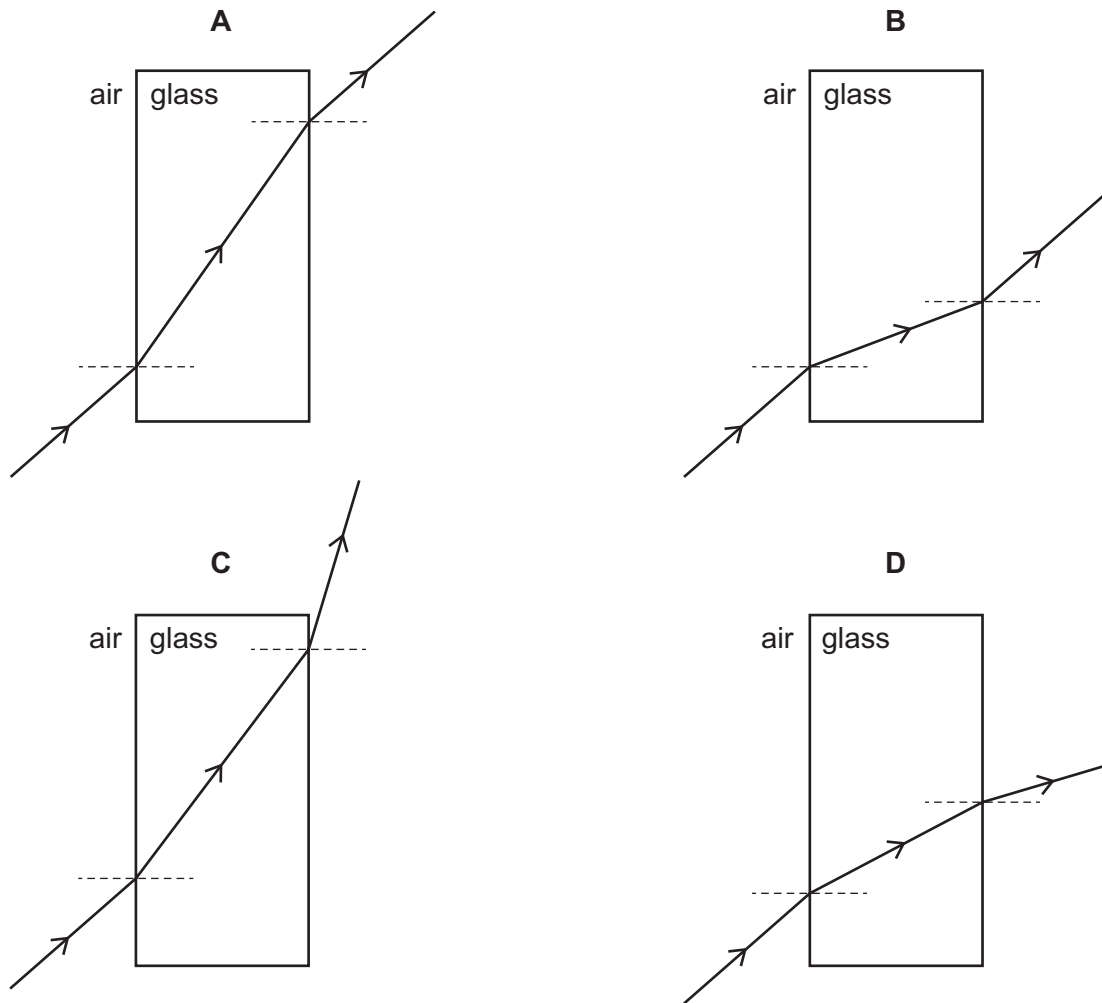


Which labelled arrows represent the amplitude and the wavelength of the wave?

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

37 Light passes through a parallel-sided block of glass.

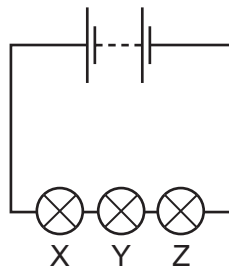
Which diagram shows how the light passes through the block?



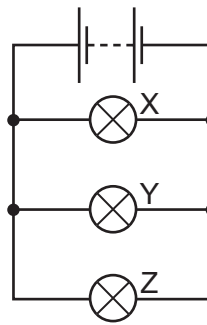
38 What is the unit of electromotive force (e.m.f.) and what is used to measure it?

	unit	measuring instrument
A	newton	newton meter
B	newton	voltmeter
C	volt	newton meter
D	volt	voltmeter

- 39 The diagrams show two ways in which three lamps X, Y and Z may be connected.



circuit 1



circuit 2

Which statement is correct?

- A If lamp Y breaks in circuit 1, both the other lamps go off.
 - B If lamp Y breaks in circuit 2, both the other lamps go off.
 - C If lamp Y breaks in circuit 1, lamp Z goes off, but lamp X remains on.
 - D If lamp Y breaks in circuit 2, lamp Z goes off, but lamp X remains on.
- 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	1 H hydrogen 1										III	IV	V	VI	VII	VIII																		
		Key atomic number atomic symbol name relative atomic mass										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	VIII											
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 —
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 —					—																	

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.).



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/13

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.

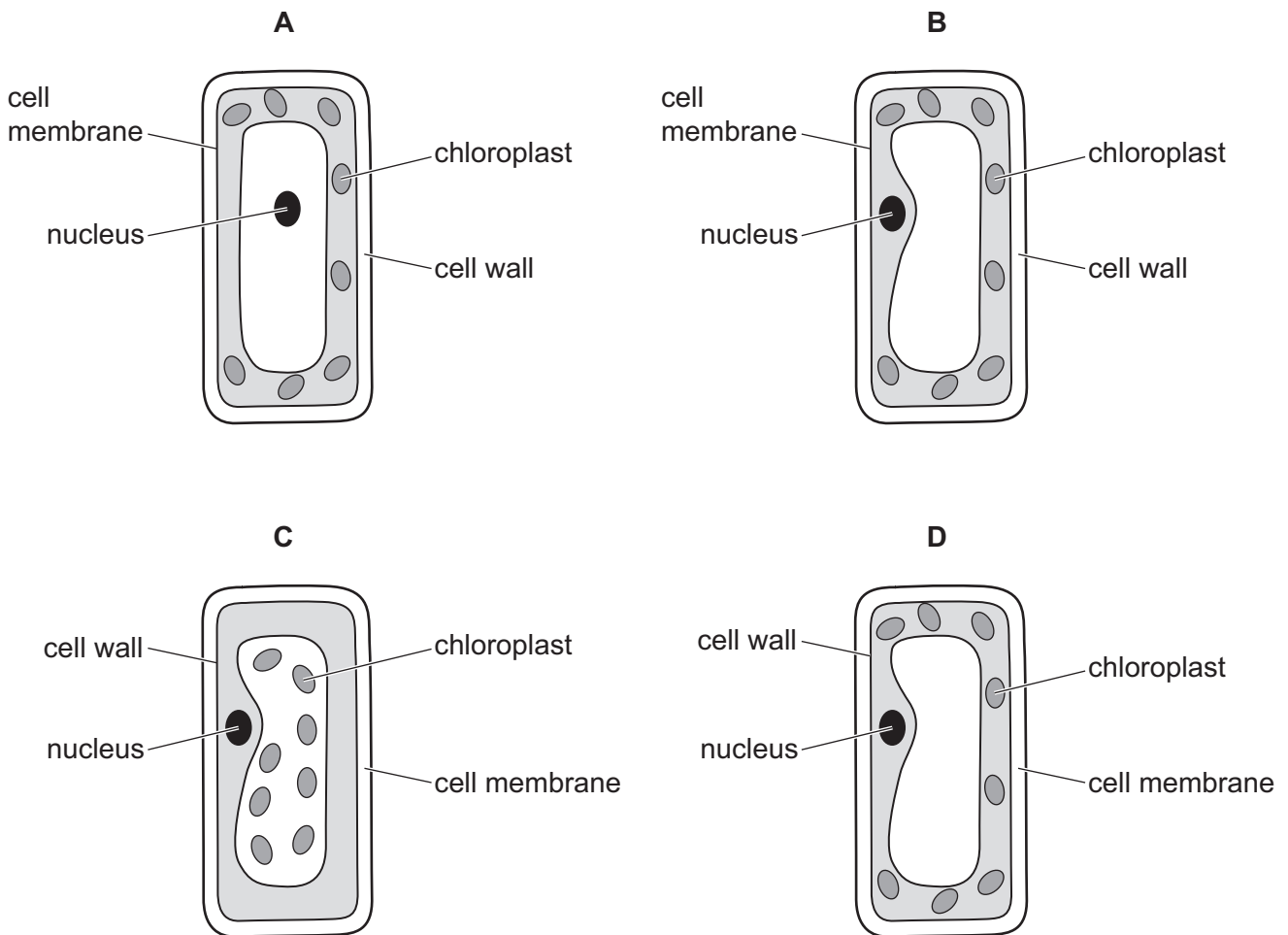
Any rough working should be done in this booklet.

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

Electronic calculators may be used.

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

1 Which diagram correctly represents a plant cell?



2 Which substance moves through a partially permeable membrane by osmosis?

- A hormones
- B oxygen
- C sugar
- D water

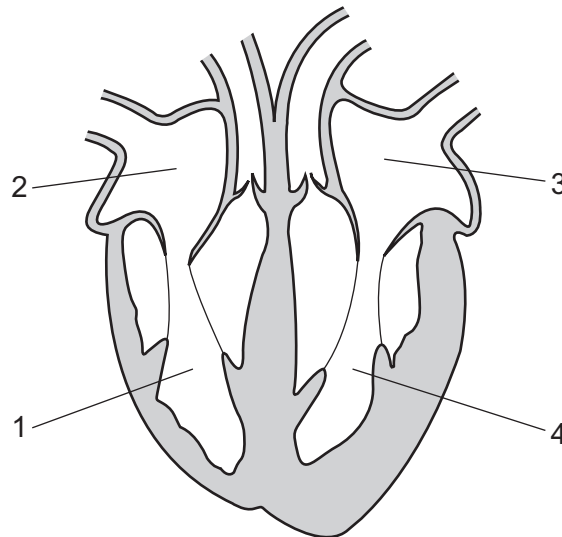
3 Which substances are used and produced during photosynthesis?

	substances used	substances produced
A	carbon dioxide and glucose	oxygen and water
B	carbon dioxide and water	glucose and oxygen
C	glucose and oxygen	carbon dioxide and water
D	oxygen and water	carbon dioxide and glucose

4 What is a function of the small intestine?

- A It cuts food into small pieces.
- B It provides a large surface area for absorption.
- C It provides space for the storage of faeces.
- D It stores food.

5 The diagram shows a section through the heart.



Which labels show the two ventricles in the heart?

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

6 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

7 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

8 Diagram 1 shows a growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

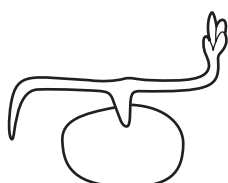


diagram 1

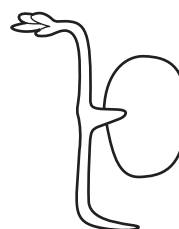


diagram 2

What is the shape of the seedling three days later?

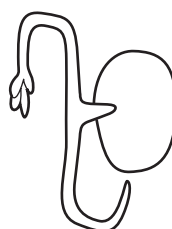
A



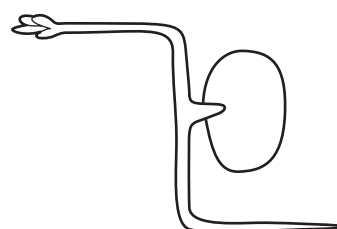
B



C



D



9 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

10 Which process is the transfer of pollen grains from the anther to the stigma?

- A** fertilisation
- B** germination
- C** pollination
- D** transpiration

11 During sexual intercourse the penis transfers sperm cells to the vagina.

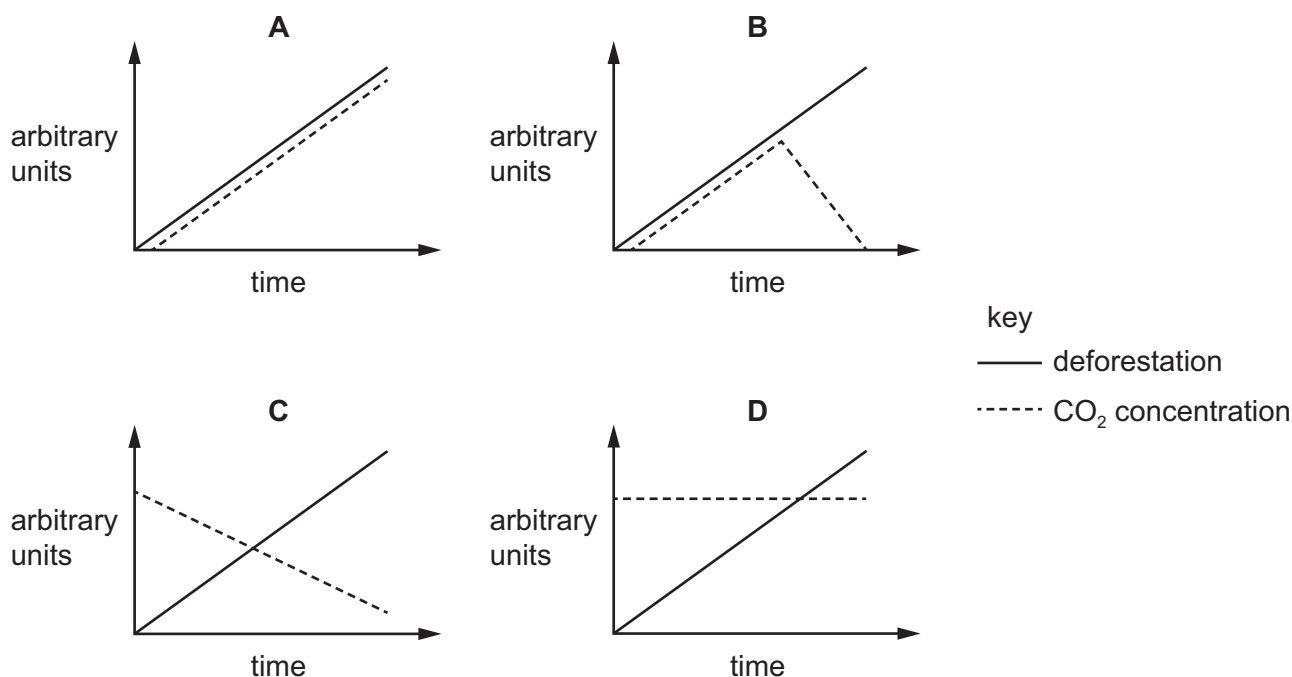
What is the pathway for sperm cells from their site of production to the vagina?

- A** sperm ducts → testes → urethra → vagina
- B** testes → sperm ducts → urethra → vagina
- C** testes → urethra → sperm ducts → vagina
- D** urethra → testes → sperm ducts → vagina

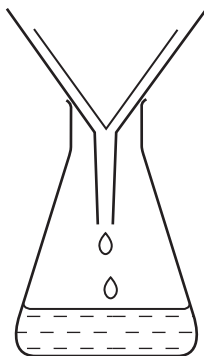
12 What is the source of energy input in food chains and food webs?

- A** carbohydrates
- B** nutrients in the soil
- C** oxygen
- D** the Sun

- 13 Which graph shows the relationship between the increase in deforestation and the carbon dioxide concentrations in the atmosphere?



- 14 The diagram shows apparatus used for filtration.



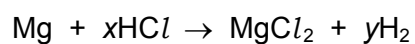
Why can sugar and salt **not** be separated by using this apparatus?

- A They are both compounds.
- B They are both white.
- C They both dissolve in water.
- D They both have the same size particles.

15 Which description of the named substance is correct?

	substance	element or mixture
A	air	mixture
B	brass	element
C	carbon dioxide	element
D	hydrogen chloride	mixture

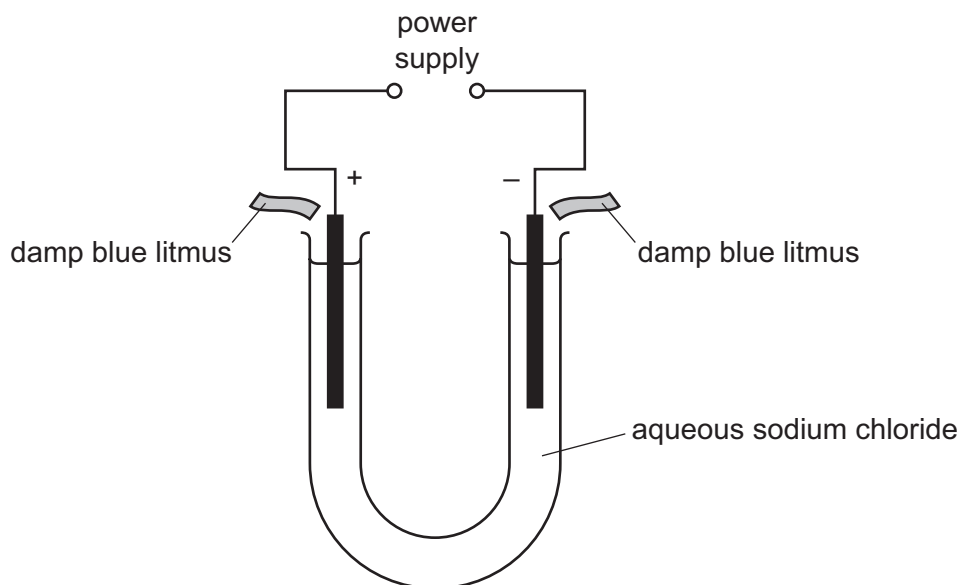
16 The equation for the reaction between magnesium and dilute hydrochloric acid is shown.



What are the values of x and y ?

	x	y
A	1	1
B	1	2
C	2	1
D	2	2

17 Concentrated aqueous sodium chloride is electrolysed using the apparatus shown.



A piece of damp blue litmus paper is held above each electrode.

Which row shows what happens to the colour of the litmus paper during the electrolysis?

	positive electrode	negative electrode
A	litmus is unchanged	litmus is unchanged
B	litmus is unchanged	litmus turns white
C	litmus turns white	litmus is unchanged
D	litmus turns white	litmus turns white

18 The temperatures at the start and at the end of four chemical reactions are shown.

Which reaction is the **most** exothermic?

	temperature at start of reaction / °C	temperature at end of reaction / °C
A	10	30
B	15	14
C	18	35
D	20	18

- 19 Zinc reacts with excess dilute sulfuric acid to form hydrogen gas.

Copper sulfate can act as a catalyst for this reaction.

Which statement is **not** correct?

- A If more concentrated sulfuric acid is used the rate of the reaction increases.
 - B If the temperature is increased it takes less time for the zinc to react completely.
 - C Larger pieces of zinc produce more hydrogen every ten seconds than the same mass of powdered zinc.
 - D When copper sulfate is added to the mixture more hydrogen is formed every second.
- 20 When hydrogen gas is passed over heated lead oxide, lead and water are produced.



Which substance is reduced during the reaction?

- A hydrogen
 - B lead
 - C lead oxide
 - D water
- 21 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+}

- 22 Which row describes the physical state of the Group VII elements at room temperature?

	chlorine	bromine	iodine
A	gas	gas	liquid
B	gas	liquid	solid
C	liquid	liquid	gas
D	liquid	solid	solid

- 23 Which two elements do **not** form an alloy?

- A carbon and sulfur
- B carbon and iron
- C copper and zinc
- D silver and gold

- 24** Which process is used to extract copper from copper oxide?
- A** heating copper oxide with carbon
 - B** heating copper oxide with carbon dioxide
 - C** heating copper oxide with hydrochloric acid
 - D** heating copper oxide with steam
- 25** Why is chlorine added to water during its purification for drinking?
- A** to dissolve solid impurities
 - B** to kill microorganisms
 - C** to remove halide ions
 - D** to remove soluble impurities
- 26** 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.
- 27** Which substances react together?
- 1 ethene and methane
 - 2 ethene and bromine
 - 3 ethene and oxygen
- A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only
- 28** A bag of flour has a mass of 540 g. The acceleration of free fall is 10 m/s^2 .
- What is the weight of the bag of flour?
- A** 5.4 N **B** 54 N **C** 540 N **D** 5400 N
- 29** What is the expression for density?
- A** $\frac{\text{mass}}{\text{volume}}$ **B** $\frac{\text{volume}}{\text{mass}}$ **C** $\frac{\text{volume}}{\text{weight}}$ **D** $\frac{\text{weight}}{\text{volume}}$

30 Which property of an object **cannot** be changed by a force?

- A mass
- B motion
- C shape
- D size

31 The temperature of a gas rises.

What happens to the molecules of the gas?

- A Their average speed decreases.
- B Their average speed increases.
- C They contract.
- D They expand.

32 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

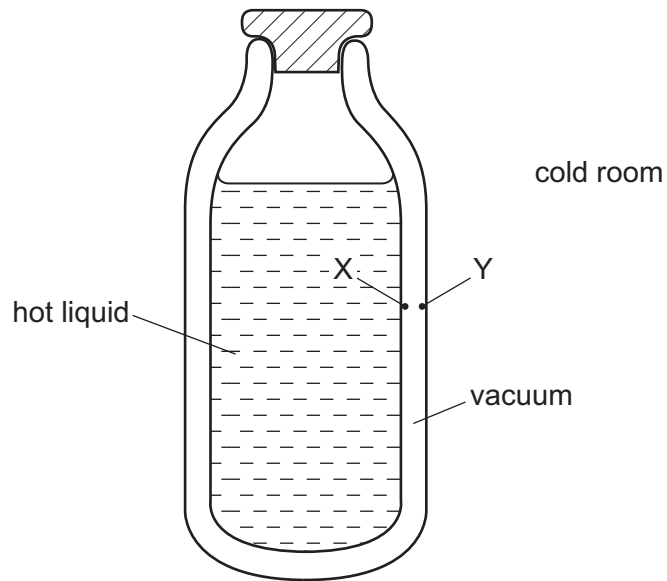
	melting point/°C	boiling point/°C
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

- A 0 °C
- B 50 °C
- C 90 °C
- D 300 °C

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

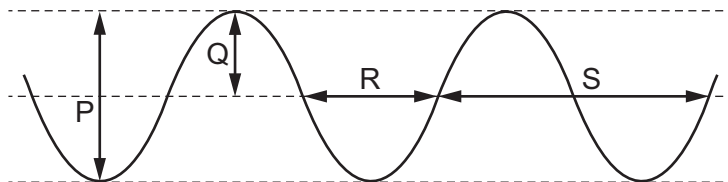
X and Y are points on the inside surfaces of the walls of the flask.



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

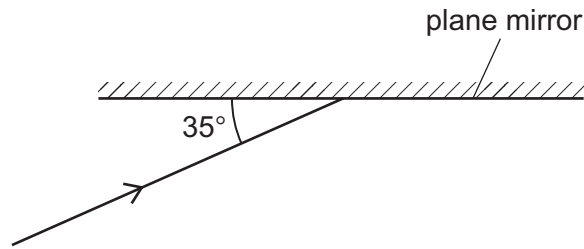
34 The diagram represents a wave at one moment.



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 The diagram shows light incident on a plane mirror.



The angle between the ray and the mirror is 35° .

What is the angle of reflection?

- A** 35° **B** 55° **C** 70° **D** 110°
- 36 Which electromagnetic radiation has the lowest frequency?
- A** gamma
B infrared
C radio
D ultraviolet
- 37 Three loudspeakers vibrate at different frequencies of 5 hertz, 15 kilohertz and 50 kilohertz.

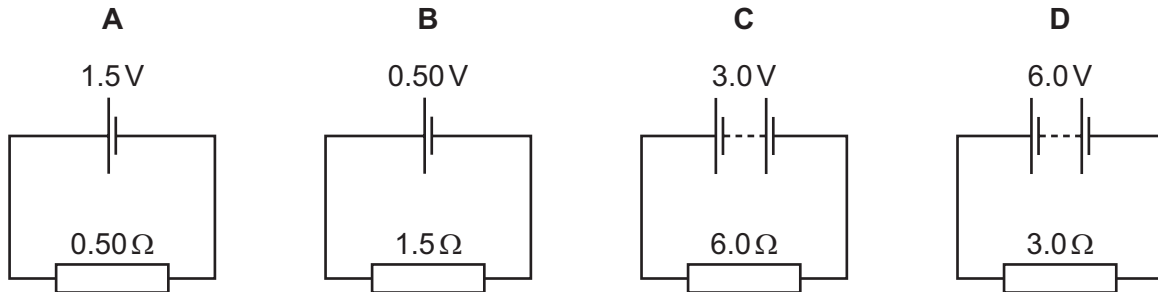
Which row shows whether the vibrations from each loudspeaker can be heard by a healthy human ear?

	5 hertz	15 kilohertz	50 kilohertz
A	no	no	no
B	no	yes	no
C	yes	no	yes
D	yes	yes	yes

38 What is the unit for electromotive force (e.m.f.)?

- A J B N C V D W

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



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		
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass										1 H hydrogen 1	5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20	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		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		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 —	—	—		