



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/11

October/November 2018

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.

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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**.

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Read the instructions on the Answer Sheet very carefully.

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A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

This document consists of **18** printed pages and **2** blank pages.



1 Which two structures are found in plant cells but **not** in animal cells?

- A cell membrane and cell wall
- B cell wall and chloroplasts
- C chloroplasts and nucleus
- D nucleus and cell membrane

2 Which process depends on diffusion?

- A circulation
- B digestion
- C gaseous exchange
- D phagocytosis

3 Biological catalysts speed up reactions in the body.

What is another name for biological catalysts?

- A antibodies
- B enzymes
- C fatty acids
- D hormones

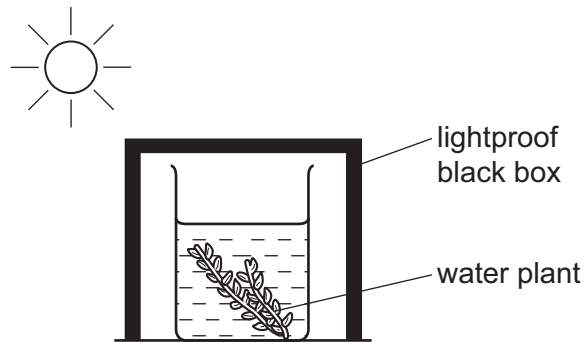
4 A food substance was tested with various reagents. The results of the tests are shown.

reagent	Benedict's solution	biuret	ethanol	iodine solution
result	turned orange	stayed pale blue	went milky	went blue / black

Which element did the food substance **not** contain?

- A carbon
- B hydrogen
- C nitrogen
- D oxygen

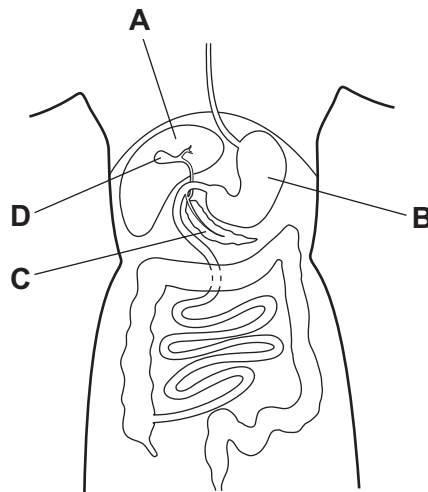
- 5 The diagram shows a water plant surrounded by a black box.



Which change takes place if the black box is removed?

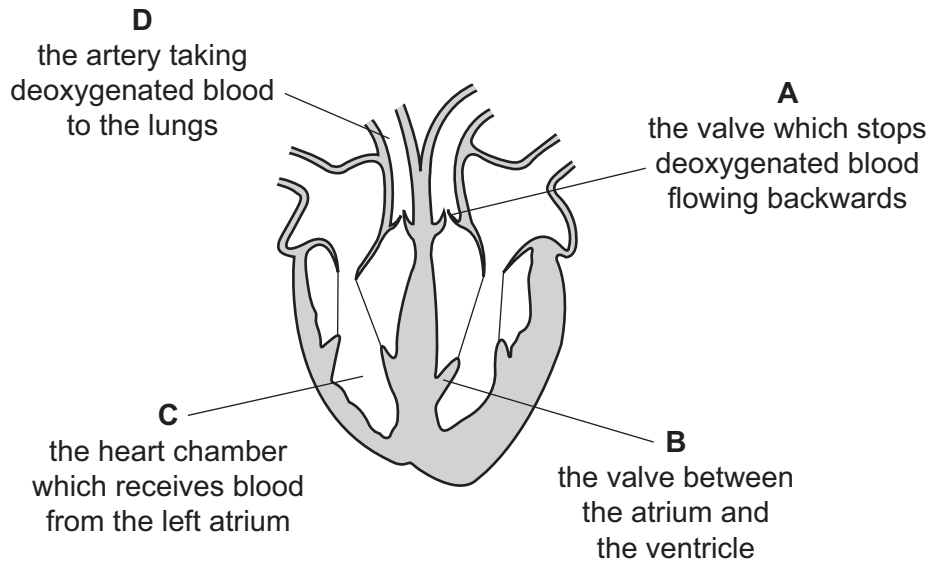
- A Oxygen production increases.
 - B Respiration stops.
 - C Stomata close.
 - D Water uptake decreases.
- 6 The diagram shows part of the human alimentary canal.

Where is bile made?



- 7 The diagram shows a section through the heart.

Which labelled part has the correct function stated?



- 8 Which word equation represents aerobic respiration?

- A** carbon dioxide + water → glucose
B carbon dioxide + water → glucose + oxygen
C glucose + oxygen → carbon dioxide
D glucose + oxygen → carbon dioxide + water

- 9 Which row states how the composition of expired air is different to the composition of inspired air?

	concentration of gases in expired air			
	carbon dioxide	oxygen	nitrogen	water vapour
A	less	less	unchanged	unchanged
B	less	more	less	more
C	more	less	unchanged	more
D	more	more	less	unchanged

- 10 Which statement about adrenaline is **not** correct?

- A** Adrenaline is transported in the blood plasma.
B Adrenaline lowers the blood glucose concentration.
C The heart is one of the target organs for adrenaline.
D The liver destroys adrenaline.

11 The diagram shows a calendar for February and March.

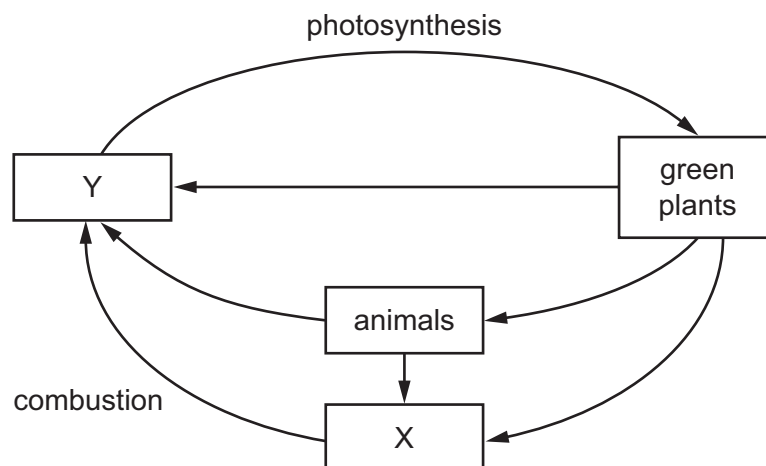
February					March				
	7	14	21	28	7	14	21	28	
1	8	15	22		1	8	15	22	29
2	9	16	23		2	9	16	23	30
3	10	17	24		3	10	17	24	31
4	11	18	25		4	11	18	25	
5	12	19	26		5	12	19	26	
6	13	20	27		6	13	20	27	

Ovulation occurs on 8 February.

When is menstruation most likely to begin?

- A 9 February–11 February
- B 14 February–16 February
- C 21 February–23 February
- D 7 March–9 March

12 The diagram shows part of the carbon cycle.



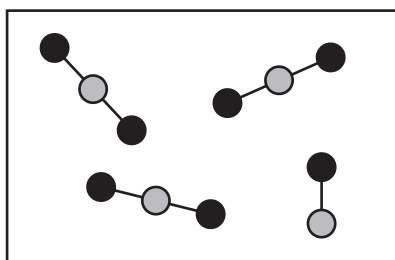
What are X and Y?

	X	Y
A	carbon dioxide	oxygen
B	fossil fuel	carbon dioxide
C	fossil fuel	oxygen
D	oxygen	carbon dioxide

13 Which are possible harmful effects of deforestation?

	global warming	species extinction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

14 The diagram represents a mixture of carbon dioxide, CO_2 , and carbon monoxide, CO .

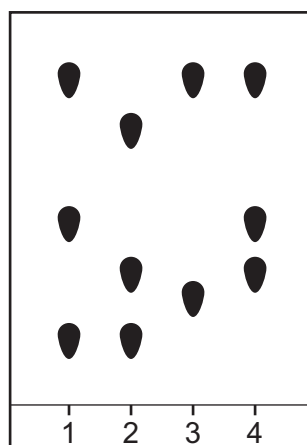


Which statement is correct?

- A** The mixture contains 4 elements.
- B** The mixture contains 4 molecules.
- C** The mixture contains 11 elements.
- D** The mixture contains 11 molecules.

15 Four dyes are separated using chromatography.

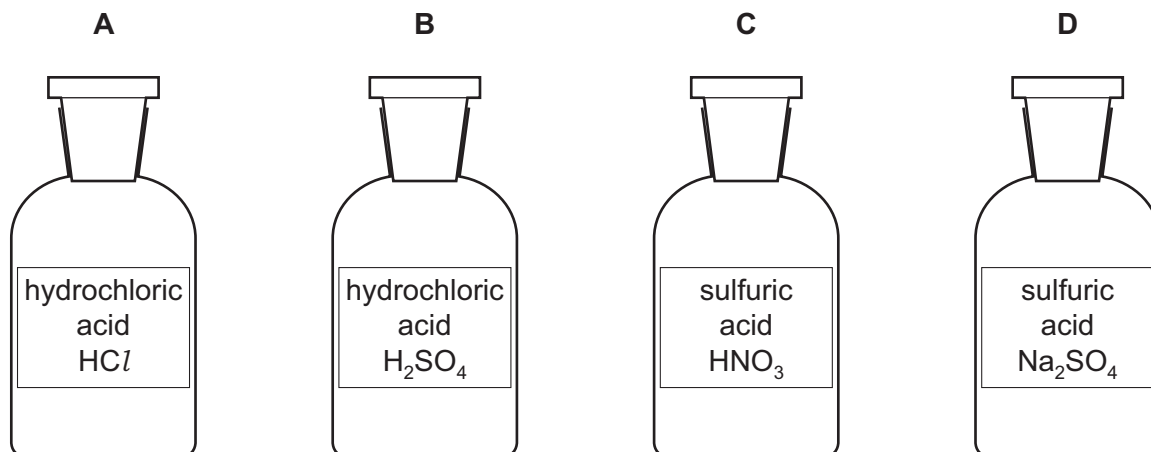
The results are shown.



Which dyes contain two colours that are present in both dyes?

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

16 On which label does the formula match the name of the acid?



17 The breakdown of molten lead bromide by 1..... forms the elements lead and bromine.

Lead is formed at the 2..... .

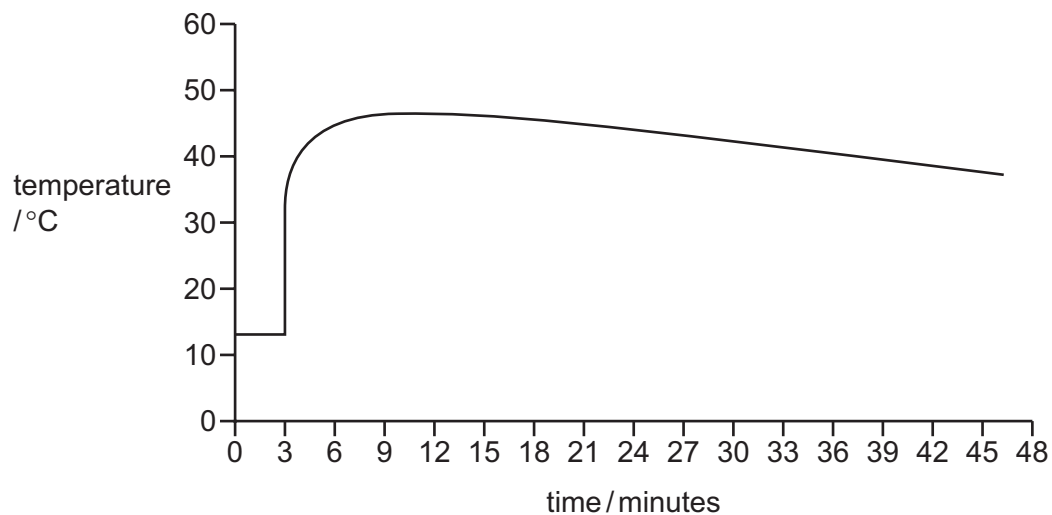
Which words complete gaps 1 and 2?

	1	2
A	electrolysis	anode
B	electrolysis	cathode
C	reduction	anode
D	reduction	cathode

18 The temperature of aqueous copper sulfate is measured.

After three minutes, magnesium is stirred into the solution. The temperature of the mixture is recorded every minute.

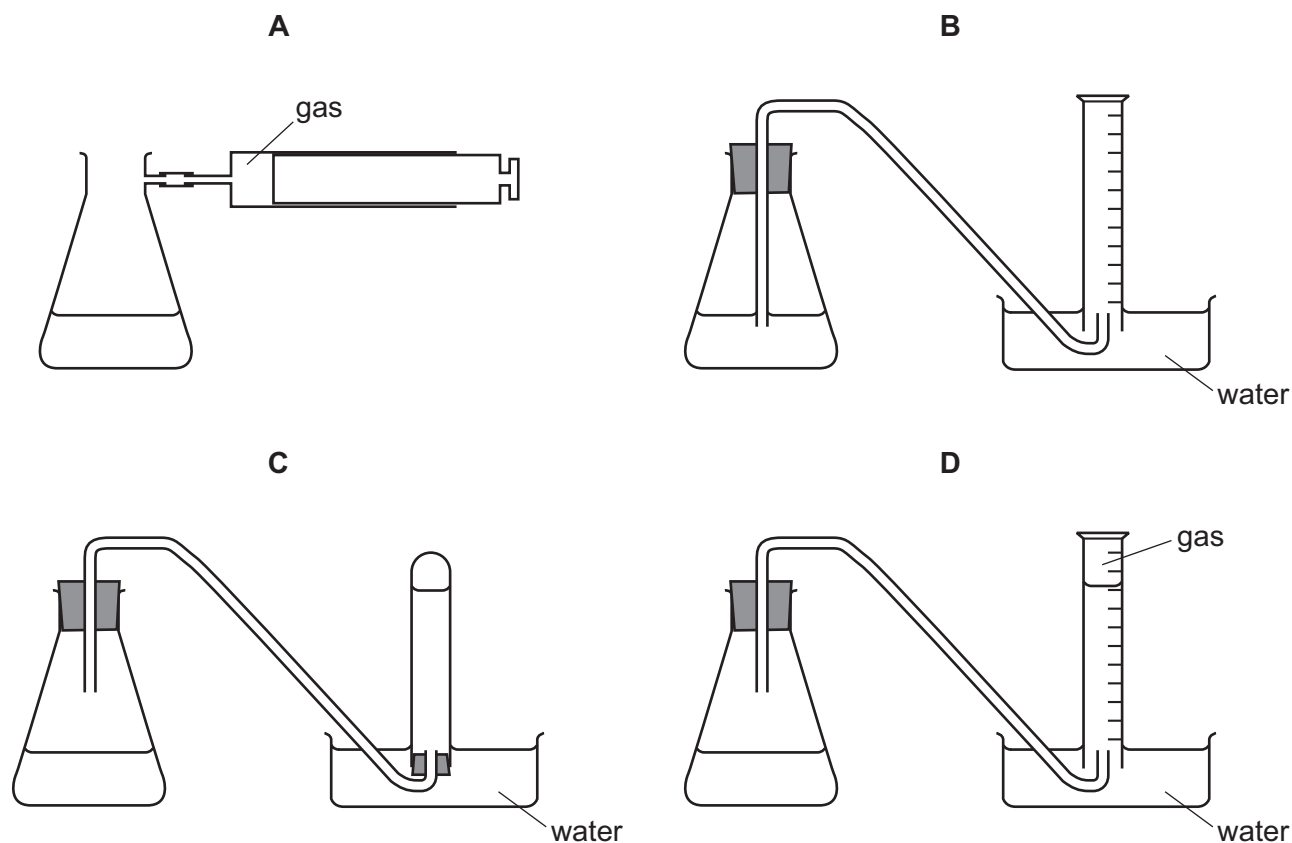
The results are shown.



Which description of the chemical reaction is correct?

- A** endothermic then exothermic
- B** endothermic only
- C** exothermic then endothermic
- D** exothermic only

- 19 Which diagram shows apparatus used to investigate the rate of a reaction in which a gas is given off?



- 20 Iron oxide reacts with carbon monoxide.

The word equation for the reaction is:



Which statement is **not** correct?

- A Carbon is neither oxidised nor reduced.
- B Carbon is oxidised.
- C Iron is reduced.
- D This is a redox reaction.

21 The results of two tests on solid P are shown.

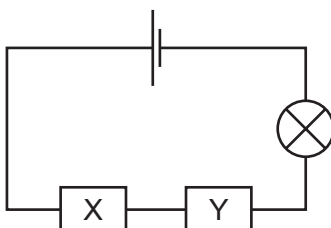
	test	result
1	add aqueous sodium hydroxide to solid	gas given off that turns moist red litmus paper blue
2	dissolve solid in water add dilute aqueous silver nitrate	white precipitate formed

What is P?

- A** aluminium carbonate
B aluminium sulfate
C ammonium chloride
D ammonium nitrate

22 Two substances, X and Y, are connected in a circuit as shown.

The lamp lights.



What are X and Y?

	X	Y
A	carbon	sulfur
B	copper	lead
C	copper	sulfur
D	sulfur	lead

23 The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?

							A								B
C	D														

24 Which process is used to extract copper from copper oxide?

- A** Heat the copper oxide on its own.
- B** Heat the copper oxide with carbon.
- C** Heat the copper oxide with carbon dioxide.
- D** Heat the copper oxide with water and then filter.

25 What is a chemical test for water?

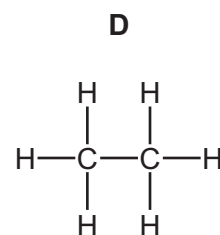
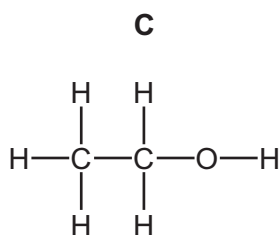
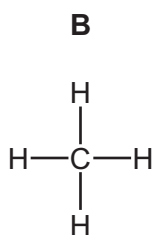
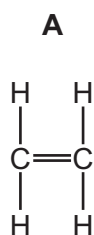
- A** It has a boiling point of 100°C .
- B** It has a density of 1 g/cm^3 .
- C** It turns anhydrous copper sulfate from white to blue.
- D** It turns pink cobalt chloride paper to blue.

26 Gasoline is a hydrocarbon fuel obtained from petroleum.

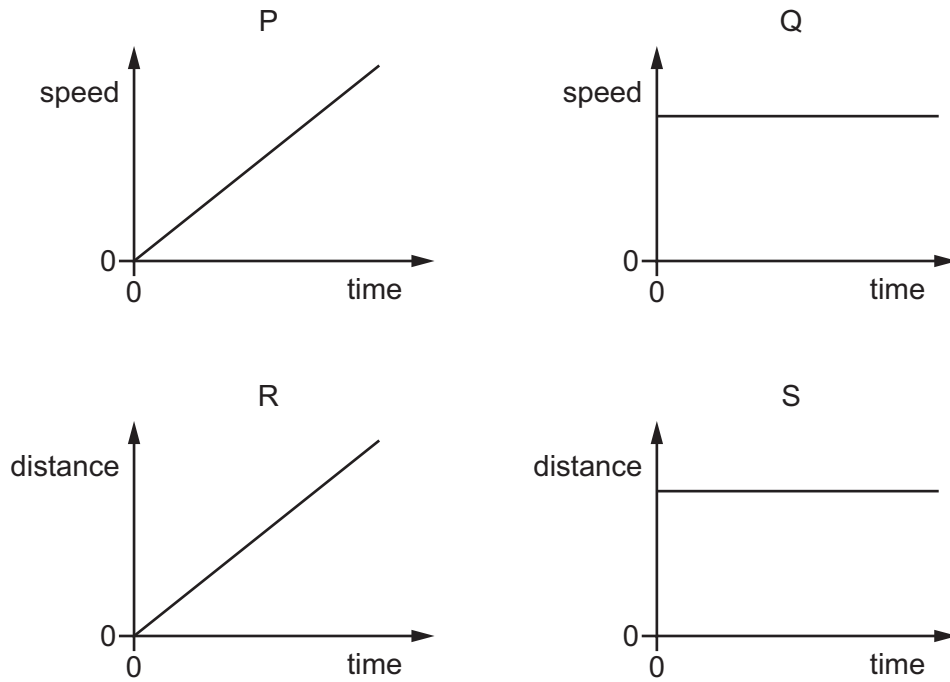
Which statement is correct?

- A** Gasoline burns to form carbon dioxide and water.
- B** Gasoline contains the elements carbon, hydrogen and oxygen.
- C** Gasoline is used as a fuel in diesel engines.
- D** The combustion of gasoline is an endothermic reaction.

27 What is the structure of ethane?



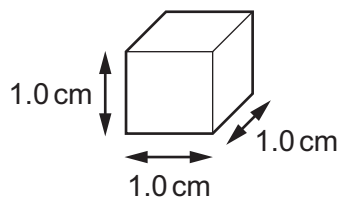
28 Graphs P and Q are speed-time graphs. Graphs R and S are distance-time graphs.



Which of the graphs represent the motion of an object moving with constant speed?

- A** P and S **B** S only **C** Q and R **D** Q only

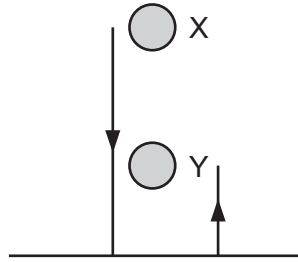
29 A cube of aluminium has sides of length 1.0 cm.



Compared with this cube, which statement about a cube of aluminium with sides of 2.0 cm is correct?

- A** It has the same density.
B It has the same mass.
C It has twice the density.
D It has twice the mass.

- 30** A ball is released from rest at position X and falls to the ground. It rebounds to a maximum height at position Y, as shown.



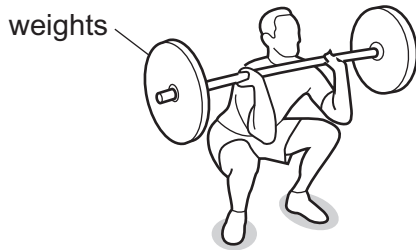
Which statement about the ball at Y is correct?

- A** It has less gravitational energy than at X.
- B** It has less kinetic energy than at X.
- C** It has less sound energy than at X.
- D** It has less thermal energy than at X.

31 Weightlifting involves a number of different stages.

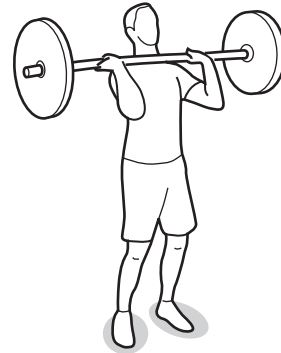
In which stage is **no** work being done on the weights?

A



The weights are lifted up off the floor.

B



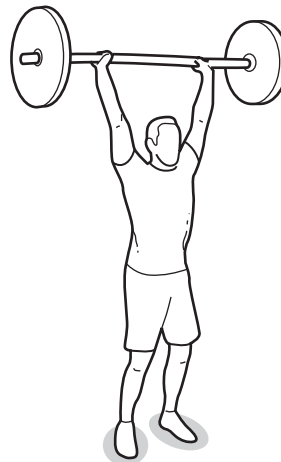
The weights are lifted as the man stands up.

C



The weights are lifted above the head.

D



The weights are held stationary above the head.

- 32** A scientist investigates two different substances, P and Q.

Substance P completely fills its container but can be compressed.

Substance Q is not in a container but has a definite shape.

In which state is each substance?

	substance P	substance Q
A	gas	liquid
B	gas	solid
C	liquid	gas
D	liquid	solid

- 33** A liquid evaporates when molecules leave its surface.

Which molecules leave the surface, and what happens to the temperature of the remaining liquid?

- A** The more energetic molecules leave and the temperature falls.
- B** The more energetic molecules leave and the temperature rises.
- C** The less energetic molecules leave and the temperature falls.
- D** The less energetic molecules leave and the temperature rises.

- 34** A student investigates a wave.

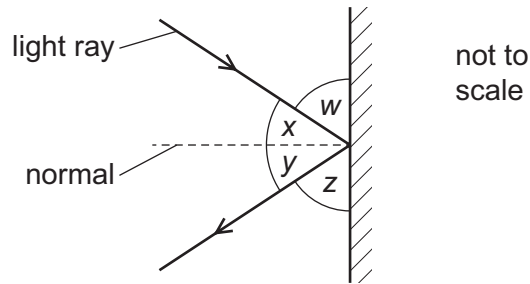
First he measures the distance between one wave crest and the next wave crest.

Next, he counts the number of wave crests passing a fixed point in one second.

Which properties of the wave has the student determined?

- A** the amplitude and the frequency
- B** the amplitude and the speed
- C** the wavelength and the frequency
- D** the wavelength and the speed

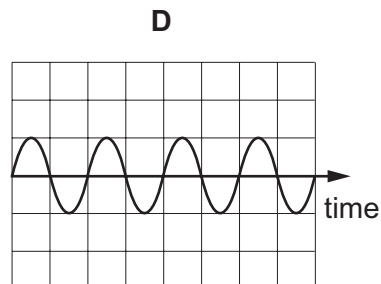
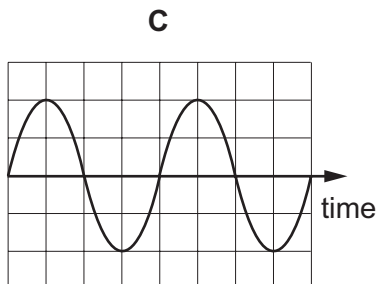
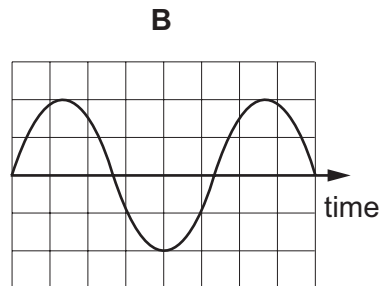
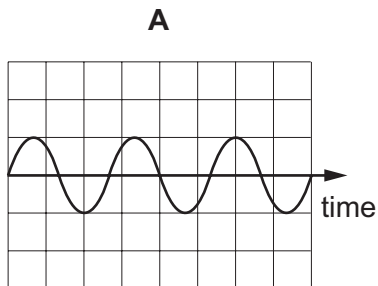
- 35 Light from a ray-box strikes a plane mirror and reflects off it.



On the diagram, four angles w , x , y and z are indicated.

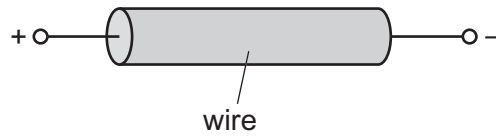
Which equation **must** be correct?

- A** $w = x$ **B** $w = z$ **C** $x = z$ **D** $y = z$
- 36 Which list shows electromagnetic waves in order of decreasing wavelength (largest to smallest)?
- A** gamma rays $\rightarrow$ radio waves $\rightarrow$ infra-red $\rightarrow$ microwaves
B microwaves $\rightarrow$ visible light $\rightarrow$ X-rays $\rightarrow$ infra-red
C radio waves $\rightarrow$ visible light $\rightarrow$ ultraviolet $\rightarrow$ X-rays
D X-rays $\rightarrow$ infra-red $\rightarrow$ microwaves $\rightarrow$ visible light
- 37 The diagrams represent four different sound waves. The scales are the same in all the diagrams.
- Which sound has the lowest pitch?



- 38 There is a current in a metal wire when a potential difference is applied across its ends.

The diagram shows which ends are connected to the positive and negative terminals.



How does the charge flow in the wire?

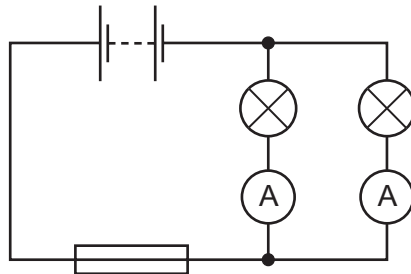
- A electrons flow from left to right
 - B electrons flow from right to left
 - C protons flow from left to right
 - D protons flow from right to left
- 39 A circuit contains a battery connected to a resistor.



Which values of electromotive force (e.m.f.) and resistance produce the smallest current?

	e.m.f./V	resistance/ Ω
A	6.0	10
B	6.0	20
C	24	80
D	24	160

- 40 Two lamps and two ammeters are connected in the circuit shown. Each ammeter reads 1.0 A.



Which is the most suitable rating for the fuse in this circuit?

- A** 0.5 A
- B** 1 A
- C** 3 A
- D** 13 A

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The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9	Key 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	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	
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 Nh nihonium —	120 Fl flerovium —

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.).



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COMBINED SCIENCE

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- 1 Movement is a characteristic of all living organisms.

Which two other characteristics of living organisms provide the energy for movement?

- A excretion and nutrition
- B growth and sensitivity
- C nutrition and respiration
- D respiration and growth

- 2 Which process depends on diffusion?

- A circulation
- B digestion
- C gaseous exchange
- D phagocytosis

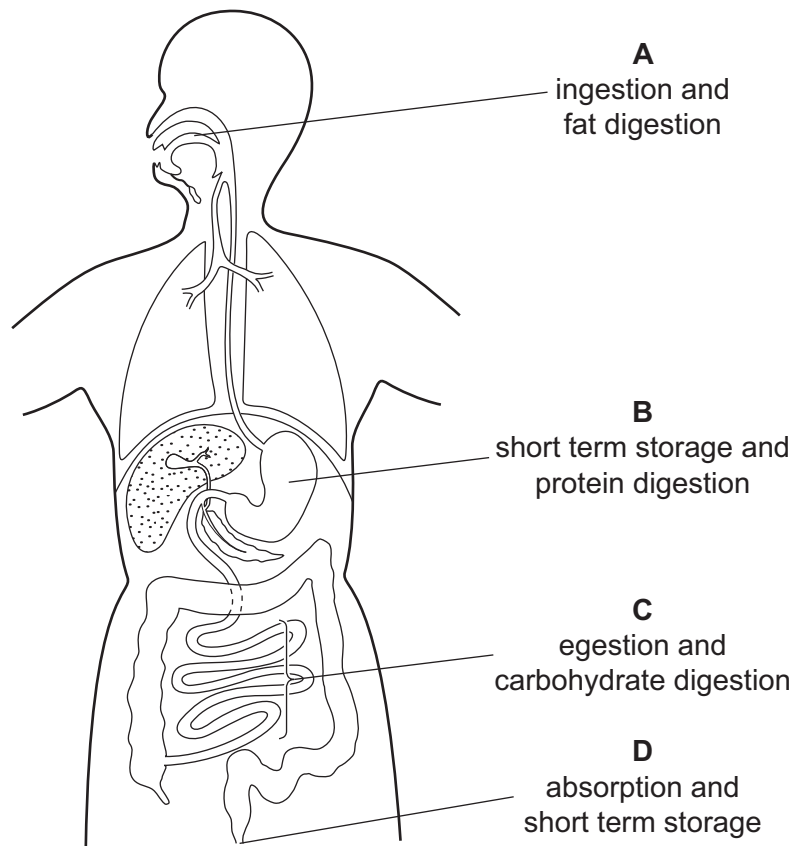
- 3 Enzymes are used in digestion to break down larger molecules into smaller molecules.

Which row matches the large molecules with the small molecules they are broken down into?

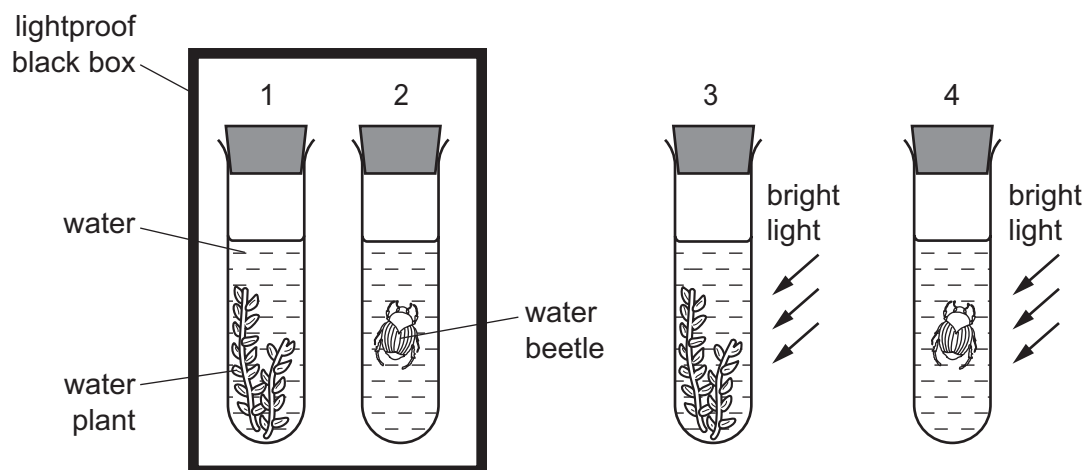
	large molecules	small molecules
A	fat	glycerol and fatty acids
B	glycogen	glycerol and amino acids
C	protein	simple sugars
D	starch	amino acids

- 4 The diagram shows the human alimentary canal. The labels state the functions of four of its parts.

Which label is correct?



- 5 The diagram shows apparatus set up to investigate photosynthesis.



In which test-tubes will the carbon dioxide concentration in the water decrease?

	test-tube			
	1	2	3	4
A	no	no	yes	no
B	no	no	yes	yes
C	yes	no	no	no
D	yes	yes	no	no

- 6 The table shows components of blood and their functions.

Which row is correct?

	blood component	function of component
A	plasma	antibody formation
B	platelets	transport of carbon dioxide
C	red blood cells	blood clotting
D	white blood cells	phagocytosis

- 7 Which word equation represents aerobic respiration?

- A** carbon dioxide + water → glucose
B carbon dioxide + water → glucose + oxygen
C glucose + oxygen → carbon dioxide
D glucose + oxygen → carbon dioxide + water

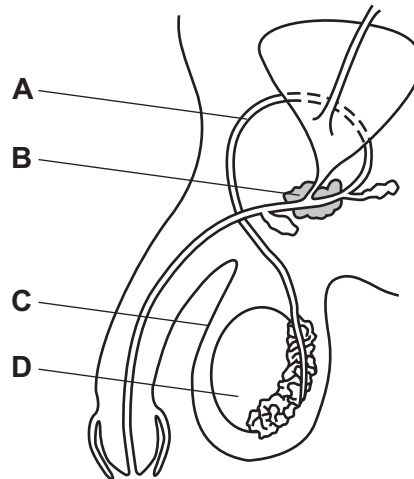
- 8 What happens to the blood glucose concentration and pulse rate when adrenaline is released into a person's bloodstream?

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

- 9 A plant produces flowers with stigmas and ovaries, but no anthers.

What effect will this have on the plant?

- A** It cannot be insect-pollinated.
B It cannot produce seeds.
C It will only be able to reproduce asexually.
D It will not be able to produce pollen grains.
- 10 The diagram shows the male reproductive system.



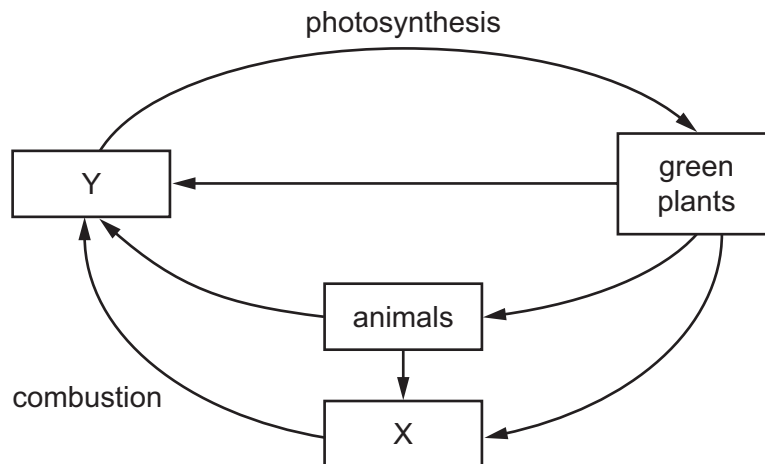
Which row names the labelled structure and states its function?

	name of structure	function of structure
A	sperm duct	sperm pass directly into the uterus from this tube
B	testis	produces the sperm
C	scrotum	holds the testis
D	prostate gland	stores the sperm

11 What is a herbivore?

- A** an organism that gets its energy by eating other animals
- B** an organism that gets its energy by eating plants
- C** an organism that makes its own organic nutrients
- D** the first organism in a food chain

12 The diagram shows part of the carbon cycle.



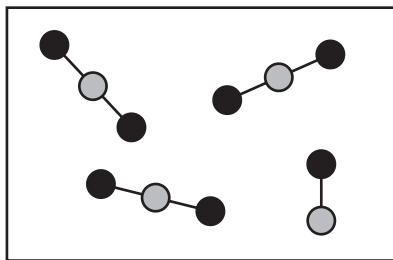
What are X and Y?

	X	Y
A	carbon dioxide	oxygen
B	fossil fuel	carbon dioxide
C	fossil fuel	oxygen
D	oxygen	carbon dioxide

13 Which are possible harmful effects of deforestation?

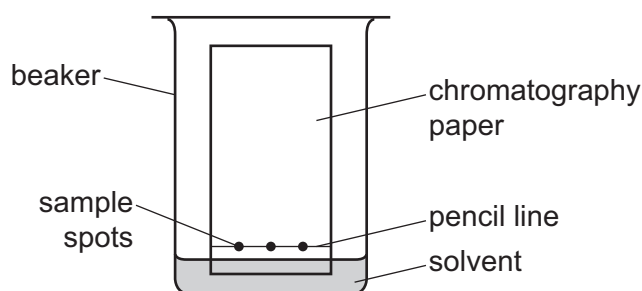
	global warming	species extinction
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 14 The diagram represents a mixture of carbon dioxide, CO_2 , and carbon monoxide, CO .



Which statement is correct?

- A The mixture contains 4 elements.
 - B The mixture contains 4 molecules.
 - C The mixture contains 11 elements.
 - D The mixture contains 11 molecules.
- 15 The apparatus used for chromatography is shown.



Which statement about the method used for chromatography is **not** correct?

- A The beaker is swirled to help the solvent to rise.
 - B The chromatography paper is placed in the beaker after the solvent has been added.
 - C The chromatography paper is removed before the solvent reaches the top of the paper.
 - D The sample spots are placed on the pencil line above the level of the solvent.
- 16 The atomic number of element X is 11.

The mass number of element X is 23.

Which statement about an atom of X is correct?

- A It contains 12 nucleons in the nucleus and 11 orbiting electrons.
- B It contains 12 nucleons in the nucleus and 11 orbiting protons.
- C It contains 23 nucleons in the nucleus and 11 orbiting electrons.
- D It contains 23 nucleons in the nucleus and 11 orbiting protons.

17 Which formula does **not** represent an acid?

- A** H_2SO_4 **B** HCl **C** HNO_3 **D** NH_3

18 The breakdown of molten lead bromide by 1..... forms the elements lead and bromine.

Lead is formed at the 2..... .

Which words complete gaps 1 and 2?

	1	2
A	electrolysis	anode
B	electrolysis	cathode
C	reduction	anode
D	reduction	cathode

19 Sodium chloride dissolves in water in an endothermic process.

When calcium chloride dissolves in water, the temperature increases.

Which statement is correct?

- A** The process of dissolving calcium chloride is neither exothermic nor endothermic.
B The temperature increases when sodium chloride dissolves.
C The temperature remains constant when sodium chloride dissolves.
D When calcium chloride dissolves in water the process is exothermic.

20 Hydrogen peroxide decomposes to form oxygen and water.

A catalyst is added to the hydrogen peroxide.

Which row describes the change in the rate of reaction and the mass of catalyst left at the end of the reaction?

	rate of reaction	mass of catalyst left at end of reaction
A	decrease	less
B	decrease	no change
C	increase	less
D	increase	no change

21 Iron oxide reacts with carbon monoxide.

The word equation for the reaction is:



Which statement is **not** correct?

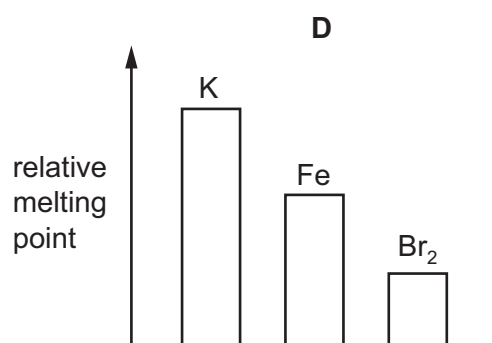
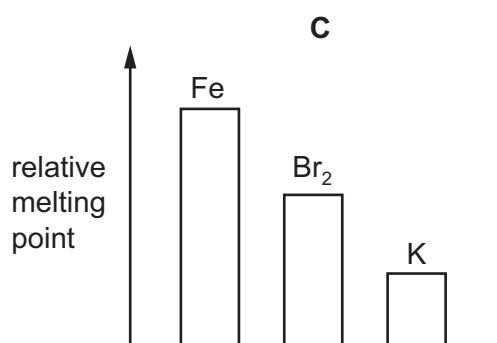
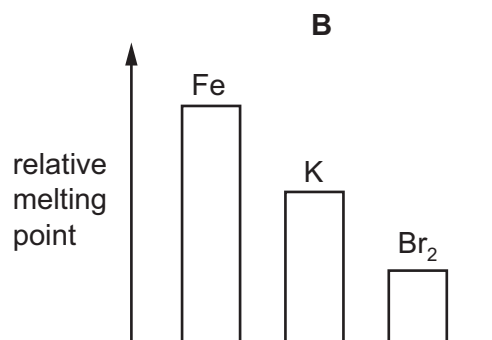
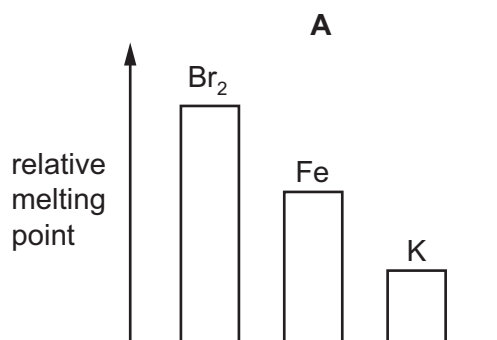
- A Carbon is neither oxidised nor reduced.
- B Carbon is oxidised.
- C Iron is reduced.
- D This is a redox reaction.

22 Compound X reacts with compound Y to form sodium sulfate, water and carbon dioxide.

What are X and Y?

	X	Y
A	sodium carbonate	hydrochloric acid
B	sodium carbonate	sulfuric acid
C	sodium hydroxide	hydrochloric acid
D	sodium hydroxide	sulfuric acid

23 Which bar chart shows the relative melting points of bromine, iron and potassium?



- 24** The positions of four elements are shown in the outline of the Periodic Table.

Which element has a high melting point and forms coloured compounds?

[illegible]

- 25** Metal X reacts rapidly with steam but only very slowly with cold water.

What is X?

- A** copper
B iron
C magnesium
D sodium

- 26** What is a chemical test for water?

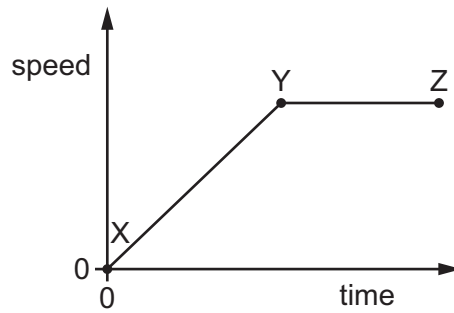
- A** Add blue cobalt chloride paper.
- B** Add blue copper sulfate crystals.
- C** Measure the density.
- D** Measure the melting point.

- 27** Gasoline is a hydrocarbon fuel obtained from petroleum.

Which statement is correct?

- A** Gasoline burns to form carbon dioxide and water.
- B** Gasoline contains the elements carbon, hydrogen and oxygen.
- C** Gasoline is used as a fuel in diesel engines.
- D** The combustion of gasoline is an endothermic reaction.

- 28 A car is travelling along a straight road. The diagram is a speed-time graph for part of its journey.



What is happening to the car between X and Y and what is happening between Y and Z?

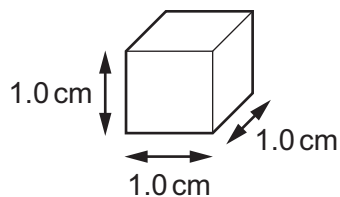
	between X and Y	between Y and Z
A	changing speed	constant speed
B	changing speed	not moving
C	constant speed	constant speed
D	constant speed	not moving

- 29 An object of known mass on Earth is taken to another planet.

Which row gives correct information about the mass of the object on the other planet?

	unit of mass	mass of object
A	kilogram	different
B	kilogram	the same
C	newton	different
D	newton	the same

- 30** A cube of aluminium has sides of length 1.0 cm.



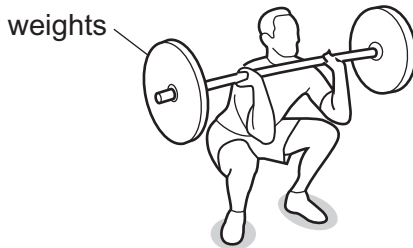
Compared with this cube, which statement about a cube of aluminium with sides of 2.0 cm is correct?

- A** It has the same density.
- B** It has the same mass.
- C** It has twice the density.
- D** It has twice the mass.

31 Weightlifting involves a number of different stages.

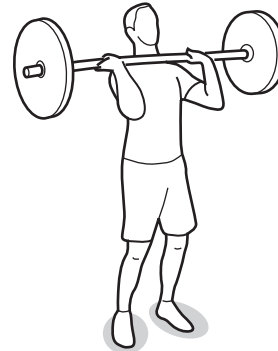
In which stage is **no** work being done on the weights?

A



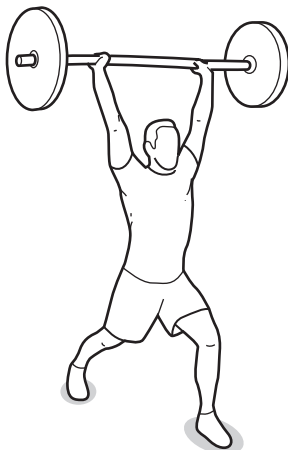
The weights are lifted up off the floor.

B



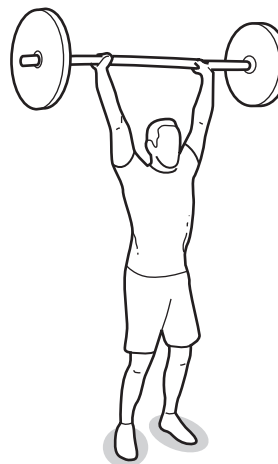
The weights are lifted as the man stands up.

C



The weights are lifted above the head.

D



The weights are held stationary above the head.

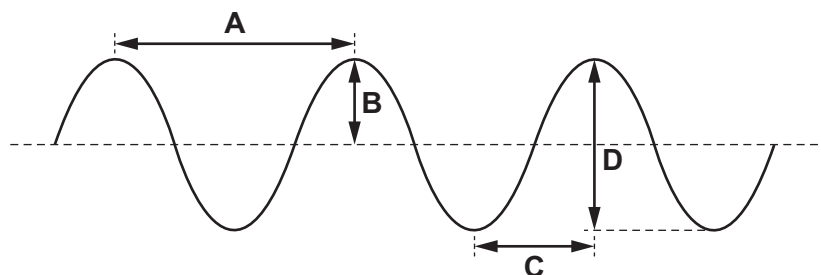
32 A liquid evaporates when molecules leave its surface.

Which molecules leave the surface, and what happens to the temperature of the remaining liquid?

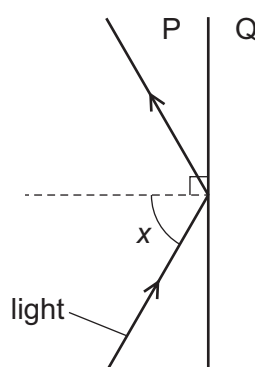
- A** The more energetic molecules leave and the temperature falls.
- B** The more energetic molecules leave and the temperature rises.
- C** The less energetic molecules leave and the temperature falls.
- D** The less energetic molecules leave and the temperature rises.

33 The diagram represents a wave.

Which labelled distance gives the amplitude of the wave?



34 The diagram shows light travelling in substance P. The light strikes substance Q at an angle of incidence x . The light is totally internally reflected.



One of the substances is air and the other substance is glass.

Which substance is air, and how does angle x compare with the critical angle?

	substance that is air	angle x
A	P	greater than critical angle
B	P	less than critical angle
C	Q	greater than critical angle
D	Q	less than critical angle

- 35** A student is watching television. He uses a remote controller to change the programme.

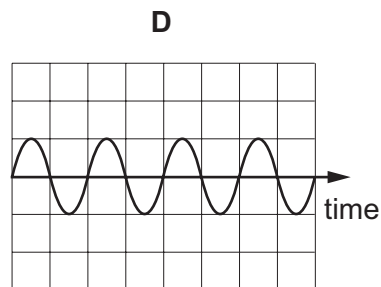
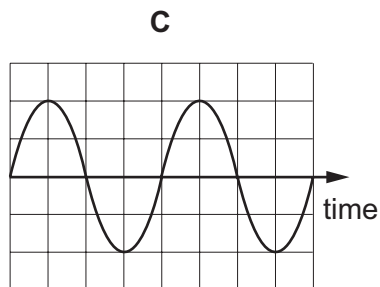
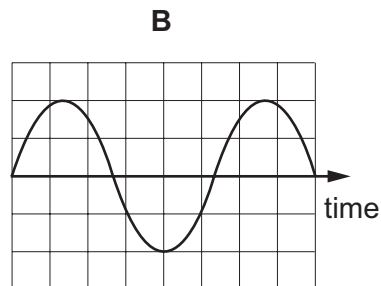
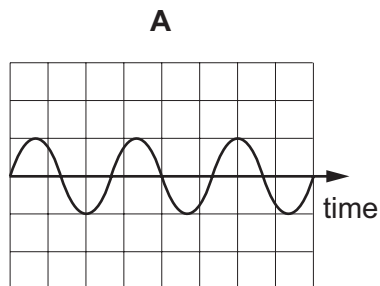
The remote controller uses electromagnetic waves. Electromagnetic waves are also used to transmit the television signals from a satellite.

Which row shows the type of wave used for each purpose?

	remote controller	satellite
A	infra-red	microwaves
B	infra-red	radio waves
C	ultraviolet	microwaves
D	ultraviolet	radio waves

- 36** The diagrams represent four different sound waves. The scales are the same in all the diagrams.

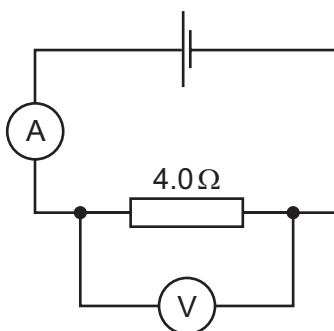
Which sound has the lowest pitch?



- 37** Which group contains only electrical insulators?

- A** air, lead, rubber
- B** copper, lead, steel
- C** plastic, rubber, wood
- D** plastic, steel, wood

- 38 The circuit shown includes a $4.0\ \Omega$ resistor.



Which pair of meter readings in the table is possible?

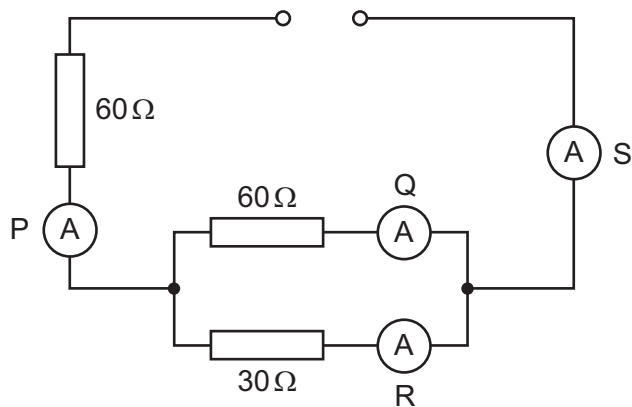
	voltmeter reading /V	ammeter reading /A
A	0.50	2.0
B	1.0	4.0
C	2.0	0.5
D	2.5	1.5

- 39 It is hazardous to use an electric hairdryer near a hot bath.

Why is this?

- A** The cable to the hairdryer might overheat.
- B** The motor in the hairdryer might become rusty and not work.
- C** The water might enter the hairdryer so the user could receive an electric shock.
- D** The warmth of the atmosphere might damage the insulation in the hairdryer.

40 The circuit contains four ammeters P, Q, R and S.



Which statement about the readings on the ammeters is correct?

- A** The reading on S is less than the reading on P.
- B** The reading on Q is greater than the reading on S.
- C** The reading on R is greater than the reading on S.
- D** The reading on Q is less than the reading on P.

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The Periodic Table of Elements

Group																											
I	II											VIII															
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass											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	54 Xe xenon 131	86 Rn radon —
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	86 Rn radon —									
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

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 International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/13

October/November 2018

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 20.

Electronic calculators may be used.

This document consists of **19** printed pages and **1** blank page.



1 What are characteristics of all living organisms?

- A** breathing, excretion, nutrition
- B** excretion, growth, nutrition
- C** reproduction, respiration, germination
- D** secretion, growth, sensitivity

2 Which process depends on diffusion?

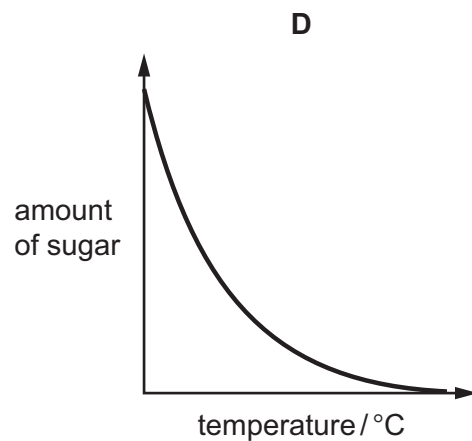
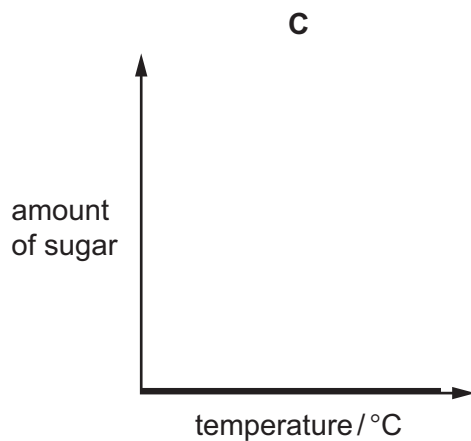
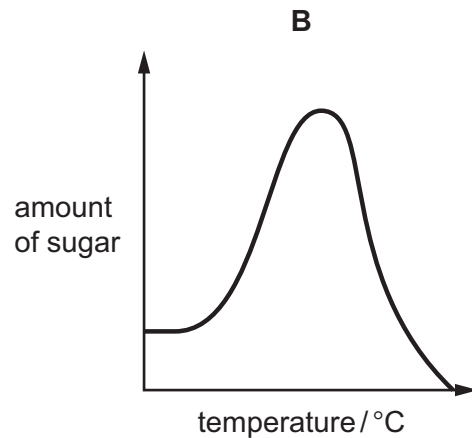
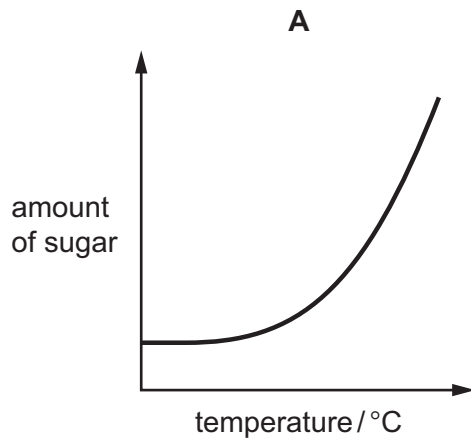
- A** circulation
- B** digestion
- C** gaseous exchange
- D** phagocytosis

- 3 A human enzyme breaks down starch into simple sugars.

A solution of this human enzyme was heated to 90 °C for 30 minutes.

2 cm³ of this human enzyme solution was added to starch solution in several different test-tubes. The test-tubes were kept at different temperatures for 15 minutes.

Which graph shows the amount of sugar produced in the test-tubes?



- 4 The table shows the results of three food tests carried out on the same food sample.

name of solution	colour change observed
Benedict's	blue to orange
biuret	remains blue
iodine	brown to black

Which nutrients are present in the food sample?

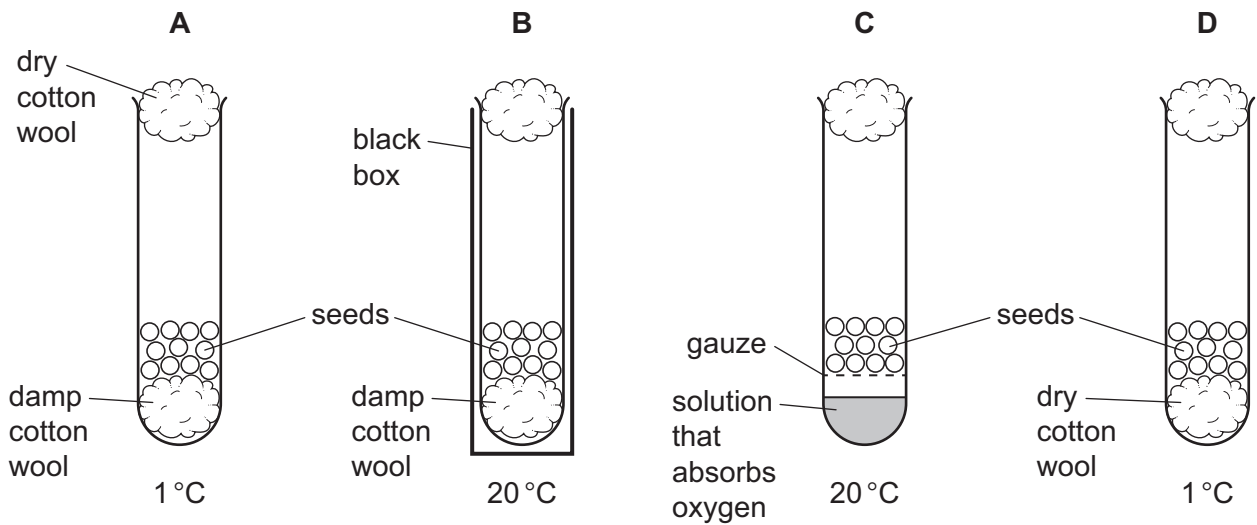
- A protein, reducing sugar and starch
 - B protein and reducing sugar only
 - C reducing sugar and starch only
 - D starch only
- 5 Transpiration involves the diffusion of water vapour from which part of a leaf?
- A chloroplast
 - B cuticle
 - C phloem
 - D stomata
- 6 Which component of the blood produces antibodies?
- A plasma
 - B platelets
 - C red blood cells
 - D white blood cells
- 7 Which word equation represents aerobic respiration?
- A carbon dioxide + water → glucose
 - B carbon dioxide + water → glucose + oxygen
 - C glucose + oxygen → carbon dioxide
 - D glucose + oxygen → carbon dioxide + water

8 Which statement about adrenaline is **not** correct?

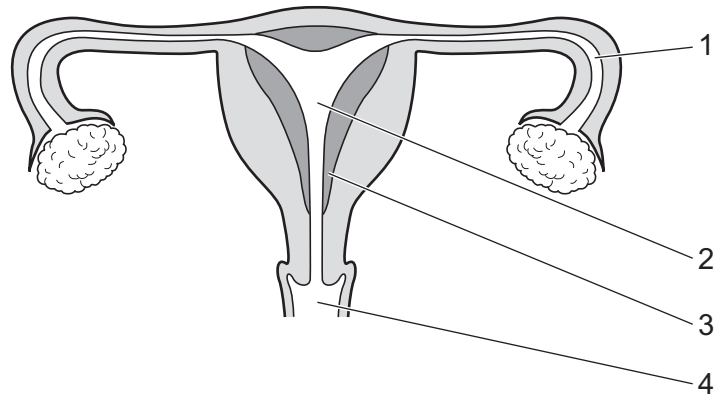
- A It decreases blood glucose concentration.
- B It is carried by the blood.
- C It is produced by a gland.
- D The heart is one of its target organs.

9 In an investigation, four test-tubes containing seeds were set up as shown in the diagram.

After several days, which test-tube will contain the most germinated seeds?



10 The diagram shows the reproductive system of a human female.



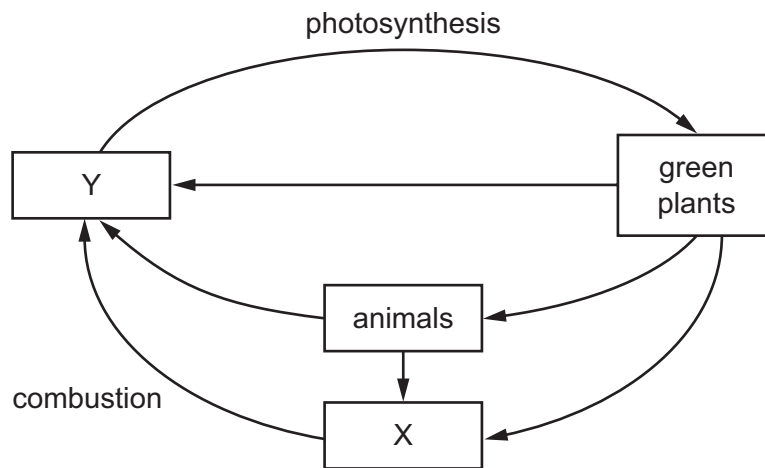
Which numbers give the places where the sperm are deposited, the egg is fertilised and implantation occurs?

	sperm deposited	egg fertilised	implantation occurs
A	3	1	2
B	3	2	3
C	4	1	3
D	4	2	2

11 Which shows a food chain?

- A** herbivore → producer → Sun
- B** producer → consumer → consumer
- C** producer → consumer → herbivore
- D** Sun → producer → herbivore

12 The diagram shows part of the carbon cycle.



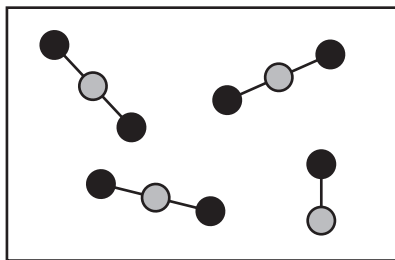
What are X and Y?

	X	Y
A	carbon dioxide	oxygen
B	fossil fuel	carbon dioxide
C	fossil fuel	oxygen
D	oxygen	carbon dioxide

13 Which are possible harmful effects of deforestation?

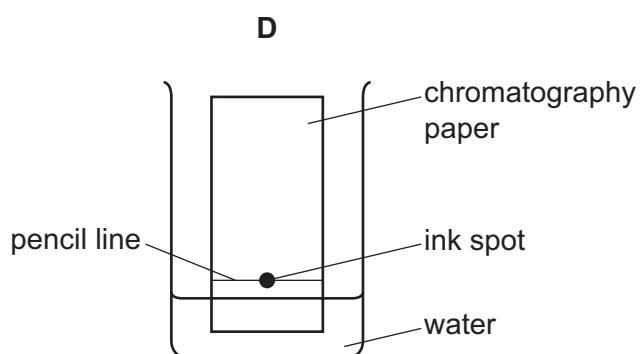
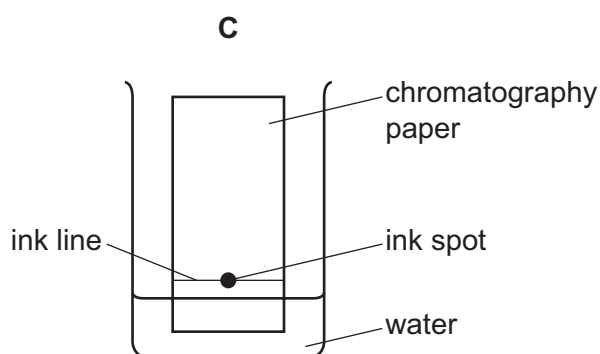
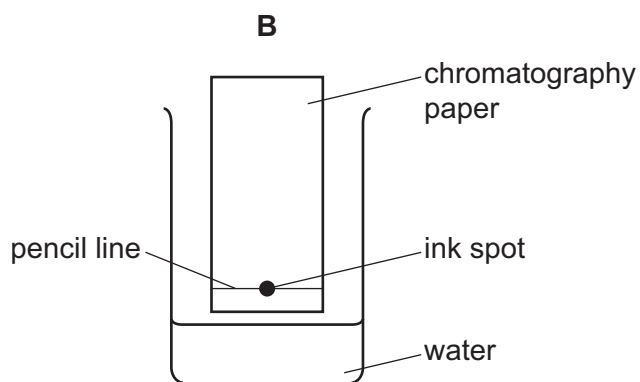
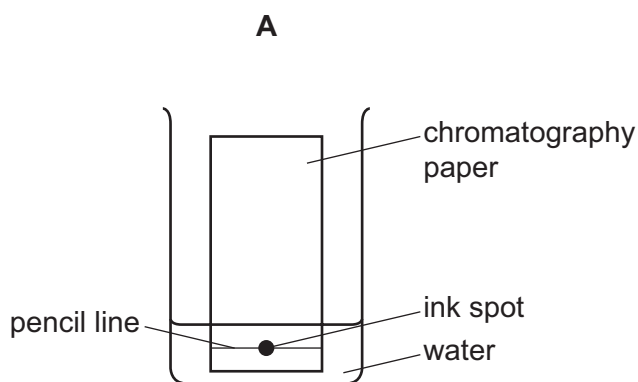
	global warming	species extinction
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 14 The diagram represents a mixture of carbon dioxide, CO_2 , and carbon monoxide, CO .

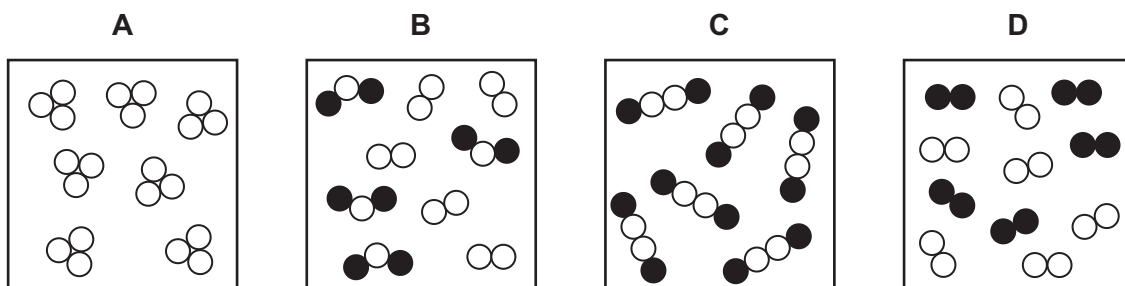


Which statement is correct?

- A The mixture contains 4 elements.
 - B The mixture contains 4 molecules.
 - C The mixture contains 11 elements.
 - D The mixture contains 11 molecules.
- 15 Which diagram shows how apparatus is used to separate the different colours in an ink?



16 Which diagram represents a mixture of elements?



17 What is the formula of nitric acid?

- A** HCl **B** HNO_3 **C** NaOH **D** NH_3

18 The breakdown of molten lead bromide by 1..... forms the elements lead and bromine.

Lead is formed at the 2.....

Which words complete gaps 1 and 2?

	1	2
A	electrolysis	anode
B	electrolysis	cathode
C	reduction	anode
D	reduction	cathode

19 Equal masses of four different solids are separately dissolved in 100 cm^3 of water.

The temperature of the water is recorded before the solid is added and then after the solid has dissolved.

Which solid dissolves with the largest endothermic change?

	initial temperature / $^{\circ}\text{C}$	final temperature / $^{\circ}\text{C}$
A	18	15
B	18	22
C	19	15
D	20	26

- 20 Substance X increases the rate of a chemical reaction, but it remains unchanged at the end of the reaction.

Which word describes substance X?

- A catalyst
- B electrolyte
- C product
- D unreactive

- 21 Iron oxide reacts with carbon monoxide.

The word equation for the reaction is:



Which statement is **not** correct?

- A Carbon is neither oxidised nor reduced.
- B Carbon is oxidised.
- C Iron is reduced.
- D This is a redox reaction.

- 22 The results of two tests on a white solid are shown.

	test	result
1	add aqueous sodium hydroxide	white precipitate formed
2	add dilute hydrochloric acid	colourless gas formed

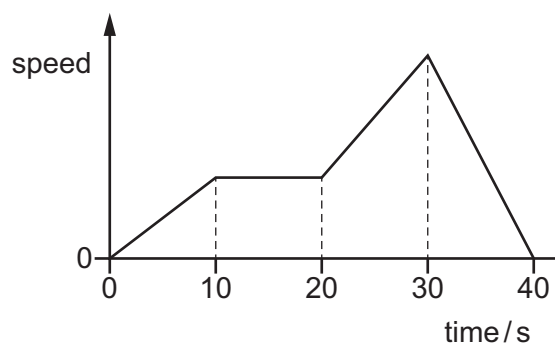
What is the white solid?

- A iron(II) carbonate
- B iron(II) chloride
- C zinc carbonate
- D zinc chloride

- 23 Which substance does **not** react with chlorine?

- A H₂
- B Kr
- C Li
- D NaBr

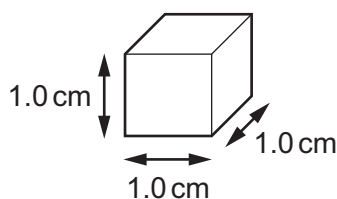
28 The diagram shows a speed-time graph for a car.



Which row describes the motion of the car at 15 s and at 35 s?

	motion at 15 s	motion at 35 s
A	at rest	moving with changing speed
B	at rest	moving with constant speed
C	moving with constant speed	moving with changing speed
D	moving with constant speed	moving with constant speed

29 A cube of aluminium has sides of length 1.0 cm.



Compared with this cube, which statement about a cube of aluminium with sides of 2.0 cm is correct?

- A** It has the same density.
- B** It has the same mass.
- C** It has twice the density.
- D** It has twice the mass.

- 30** The table compares the output of **thermal** energy per second from four different lamps. Each lamp takes in 100 J of input energy per second.

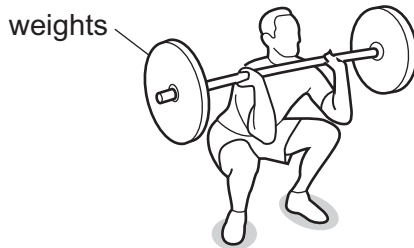
Which lamp is the most efficient at producing **light** energy?

	lamp	thermal energy per second / J
A	compact fluorescent	65
B	halogen	85
C	incandescent	95
D	L.E.D.	25

31 Weightlifting involves a number of different stages.

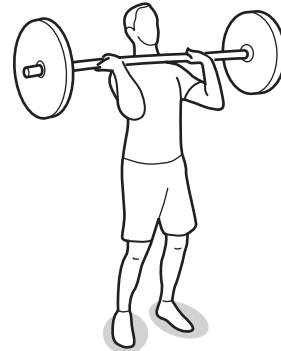
In which stage is **no** work being done on the weights?

A



The weights are lifted up off the floor.

B



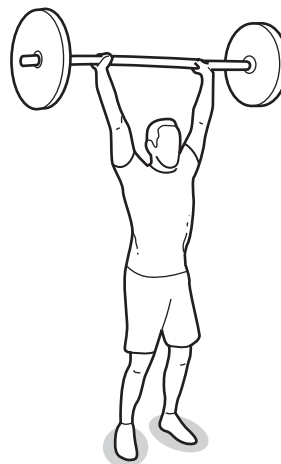
The weights are lifted as the man stands up.

C



The weights are lifted above the head.

D



The weights are held stationary above the head.

32 A liquid evaporates when molecules leave its surface.

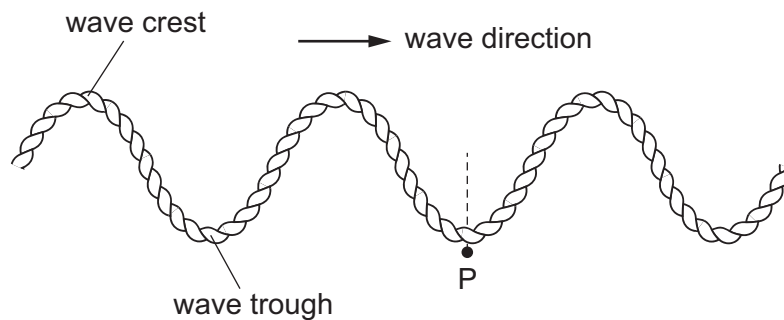
Which molecules leave the surface, and what happens to the temperature of the remaining liquid?

- A** The more energetic molecules leave and the temperature falls.
- B** The more energetic molecules leave and the temperature rises.
- C** The less energetic molecules leave and the temperature falls.
- D** The less energetic molecules leave and the temperature rises.

- 33** Convection is a process by which thermal energy is transferred from one place to another.

Where can convection take place?

- A** in a gas and in a vacuum
 - B** in a liquid and in a gas
 - C** in a liquid and in a solid
 - D** in a solid and in a vacuum
- 34** The diagram shows a wave travelling along a rope. Ten wave troughs pass the fixed point P in 2.0 seconds.

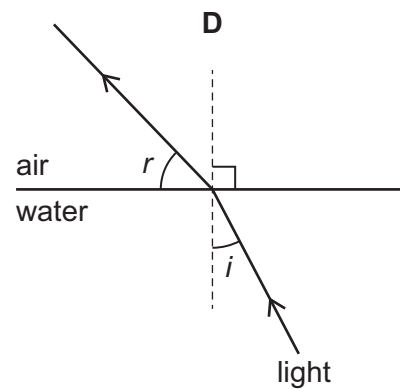
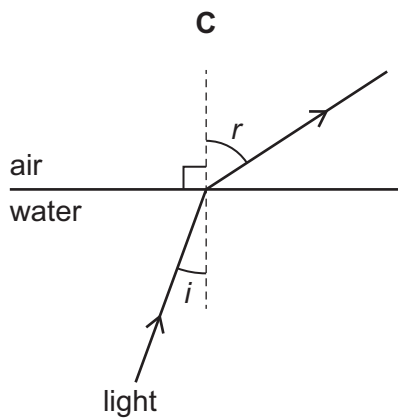
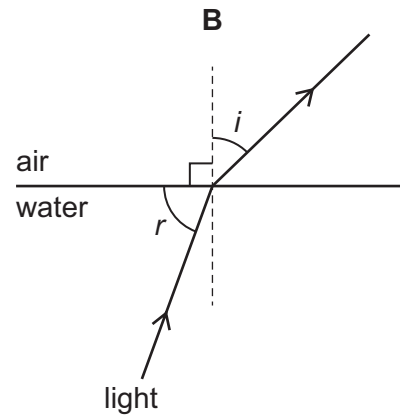
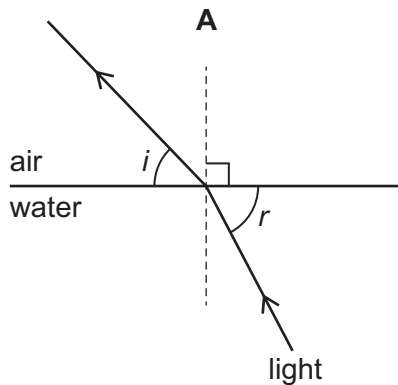


What does this indicate about the wave?

- A** It has a frequency of 0.20 Hz.
- B** It has a frequency of 5.0 Hz.
- C** It has a speed of 0.50 m/s.
- D** It has a speed of 5.0 m/s.

35 The diagram shows light passing from water into air.

Which diagram shows the angle of incidence i and the angle of refraction r correctly labelled?



36 A hidden security system transmits electromagnetic waves into an area where people work.

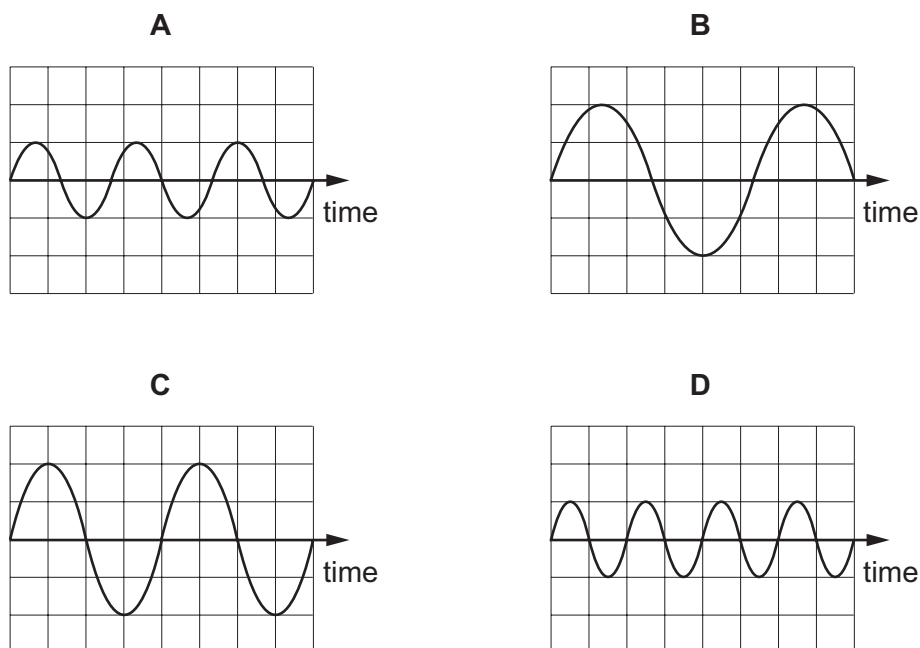
The waves that can be used must have a frequency **less** than the frequency of visible light.

Which of the electromagnetic waves that can be used has the highest frequency?

- A** gamma
- B** infra-red
- C** radio
- D** ultraviolet

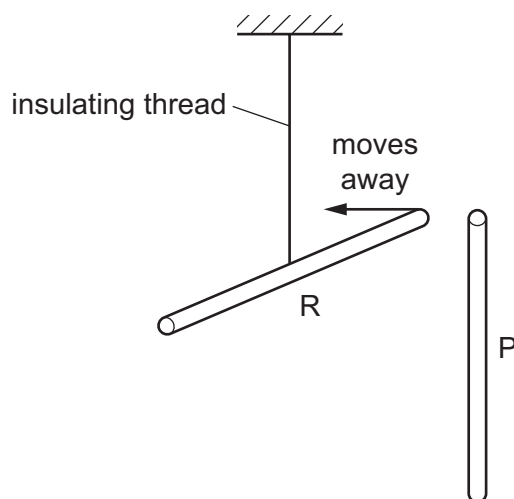
37 The diagrams represent four different sound waves. The scales are the same in all the diagrams.

Which sound has the lowest pitch?



38 The diagram shows a rod R suspended by an insulating thread. Rod R is positively charged.

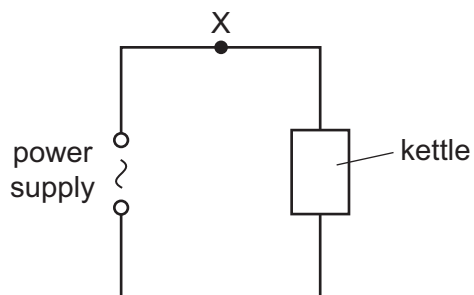
A second rod P is brought close to rod R. Rod R moves away from rod P.



What is the charge, if any, on rod P?

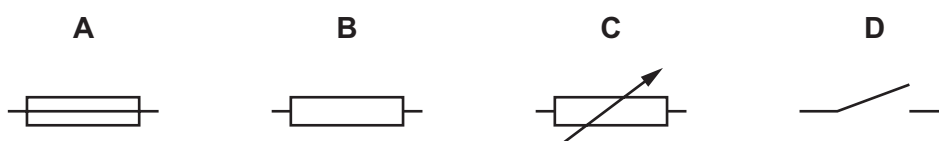
- A The charge on P could be positive or negative.
- B The charge on P is negative.
- C The charge on P is positive.
- D There is no charge on P.

- 39 A kettle is connected to a power supply as shown.

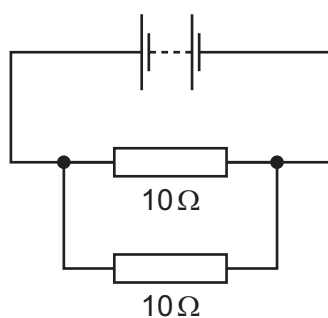


If too much current flows, a component connected at X automatically disconnects the power supply.

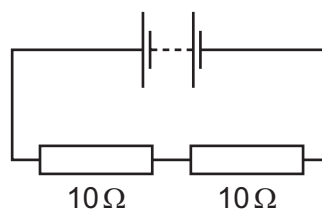
Which symbol represents the component at X?



- 40 The diagram shows two circuits each containing two $10\ \Omega$ resistors.



circuit 1



circuit 2

What is the resistance of each circuit?

	circuit 1	circuit 2
A	greater than $10\ \Omega$	greater than $10\ \Omega$
B	greater than $10\ \Omega$	less than $10\ \Omega$
C	less than $10\ \Omega$	greater than $10\ \Omega$
D	less than $10\ \Omega$	less than $10\ \Omega$

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The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9	Key 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
	11 Na sodium 23																
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						
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

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.).