



Cambridge IGCSE™

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/11

May/June 2024

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

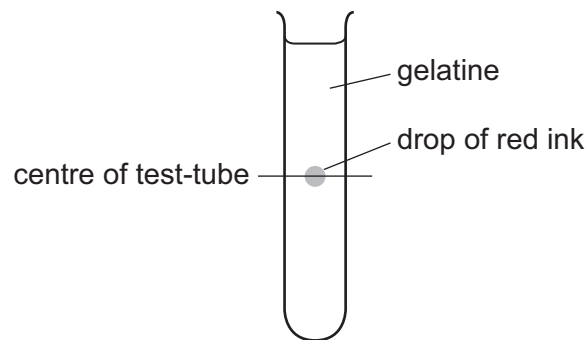
- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages.

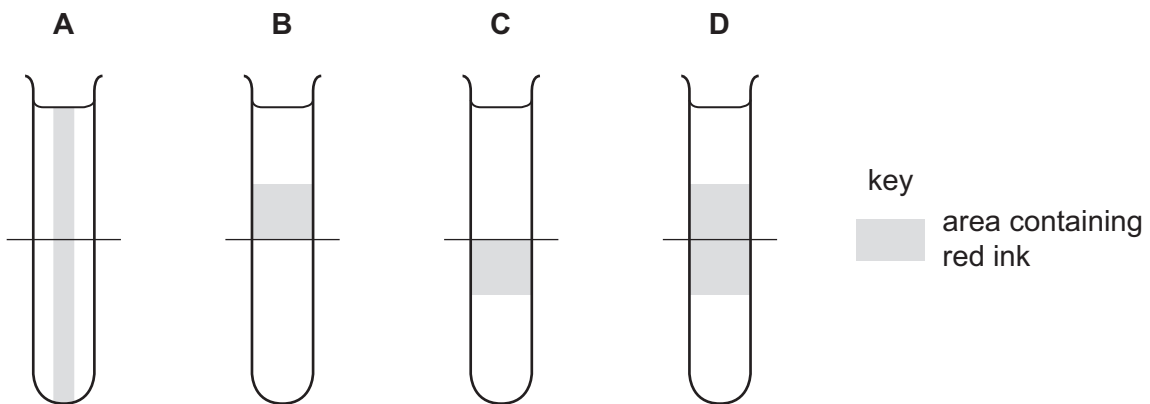


- 1 Which characteristic of living organisms is the removal of substances in excess of requirements?
- A** excretion
B nutrition
C reproduction
D respiration
- 2 A drop of red ink is injected into the centre of a test-tube containing gelatine. Gelatine is a clear substance that allows ink particles to diffuse through it.

The diagram shows the test-tube at the start of the experiment.



Which diagram correctly shows the appearance of the test-tube after a period of time?



- 3 Glycogen, protein and starch are large molecules.

Which row correctly names the smaller molecules that combine to produce these large molecules?

	large molecules		
	glycogen	protein	starch
A	glucose	amino acids	glucose
B	glucose	amino acids	glycerol
C	glycerol	fatty acids	glycerol
D	glycerol	fatty acids	glucose

4 Which statement about enzymes is correct?

- A Enzyme activity always continues to increase as the temperature increases.
- B Enzyme activity is **not** affected by pH.
- C Enzymes are biological catalysts.
- D Enzymes are proteins that always slow down reactions.

5 Vegetarians do **not** eat meat.

Which nutrient in meat do vegetarians need to get from other kinds of food?

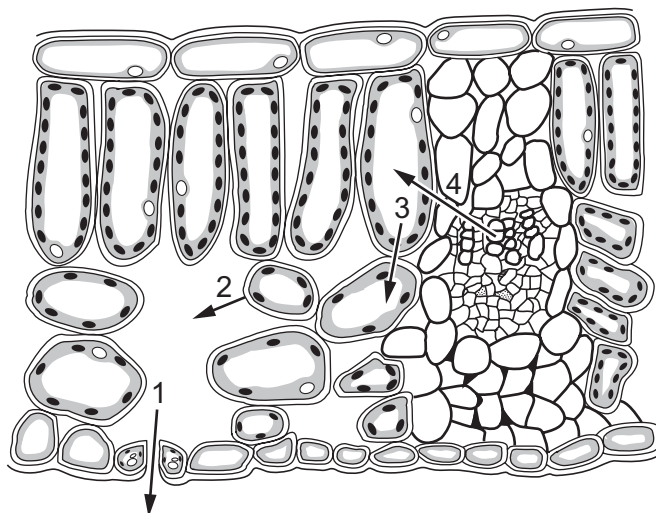
- A fibre
- B protein
- C starch
- D vitamin C

6 Chemical digestion occurs in the alimentary canal so that molecules can be absorbed.

Which type of molecules are absorbed?

- A large insoluble molecules
- B large soluble molecules
- C small insoluble molecules
- D small soluble molecules

- 7 The diagram shows a section through a leaf. The arrows represent the movement of water by diffusion, evaporation or osmosis.



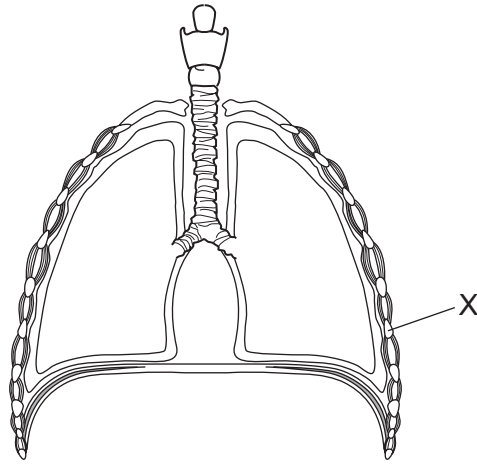
Which arrows represent diffusion and evaporation?

	diffusion	evaporation
A	1	2
B	2	3
C	3	4
D	4	1

- 8 Which row is correct for inspired air when it is compared to expired air?

	oxygen	carbon dioxide	water vapour
A	higher	lower	higher
B	higher	lower	lower
C	lower	higher	lower
D	lower	higher	higher

- 9 The diagram shows the human gas exchange system.



Which part of the gas exchange system is labelled X?

- A bronchus
- B diaphragm
- C rib
- D trachea

10 The table shows some data about a student.

pupil size in eye	pulse rate /beats per minute
	68

The student is frightened by a sudden loud noise.

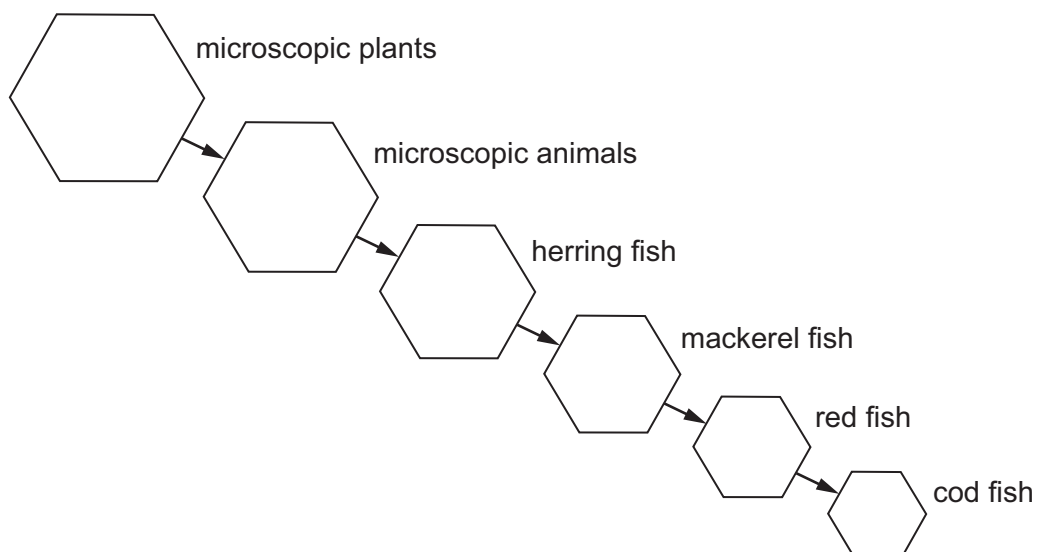
Which row shows the results immediately after the loud noise?

	pupil size in eye	pulse rate /beats per minute
A		60
B		80
C		60
D		80

11 Which row is correct for asexual reproduction?

	genetically identical offspring	fusion of nuclei	number of parents
A	no	yes	two
B	yes	no	one
C	no	yes	one
D	yes	no	two

12 The diagram represents a food chain found in the sea.

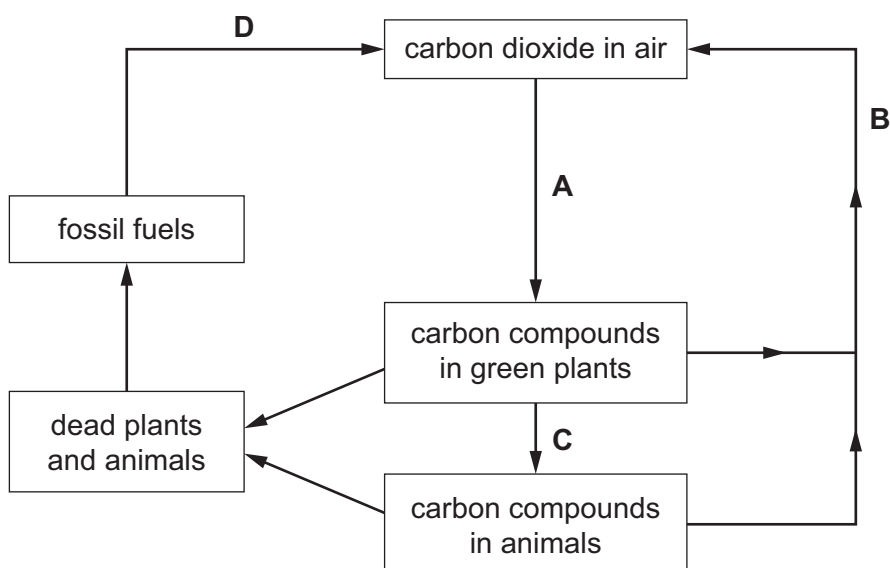


How many consumer levels are there?

- A** 1 **B** 4 **C** 5 **D** 6

13 The diagram shows part of the carbon cycle.

Which arrow represents combustion?



- 14** A fixed mass of argon gas in a sealed container is heated.

The pressure inside the container increases.

Which statement explains why the pressure increases?

- A** There is an increase in the number of gaseous particles inside the container.
- B** There is an increase in the number of collisions per second between the particles of gas and the walls of the container.
- C** The particles of gas have less energy and collide with the wall of the container more frequently.
- D** There is a decrease in the space that the particles have to move in.

- 15** Which processes are physical changes?

- 1 burning methane gas
- 2 dissolving sugar in water
- 3 evaporating ethanol
- 4 melting an ice cube
- 5 rusting of iron

- A** 1, 3 and 4 **B** 1, 4 and 5 **C** 2, 3 and 4 **D** 2, 3 and 5

- 16** The nucleon number (mass number) is the total number of 1..... and 2..... in the nucleus of an atom.

Which words complete this sentence?

	1	2
A	protons	neutrons
B	protons	electrons
C	neutrons	electrons
D	neutrons	shells

- 17** Sodium chloride is represented by NaCl .

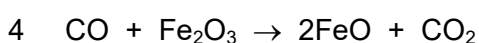
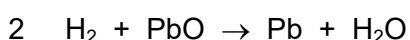
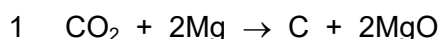
What is this representation called?

- A** a dot-and-cross diagram
- B** an equation
- C** a formula
- D** a symbol

18 What is observed when molten lead(II) bromide is electrolysed using inert electrodes?

- A** Bubbles of a brown gas appear at the anode.
- B** Bubbles of colourless gases appear at both electrodes.
- C** Bubbles of a colourless gas appear at the cathode only.
- D** No gas bubbles are observed at either electrode.

19 Four equations for reactions involving oxidation and reduction are listed.



Which statement is correct?

- A** In reaction 1, the Mg is being reduced.
- B** In reaction 2, the PbO is being oxidised.
- C** In reaction 3, the CuO is being oxidised.
- D** In reaction 4, the Fe_2O_3 is being reduced.

20 A mixture of ammonium carbonate and ammonium chloride is heated with aqueous sodium hydroxide.

Which gas is produced?

- A** ammonia
- B** carbon dioxide
- C** chlorine
- D** hydrogen chloride

21 An atom of an element in the Periodic Table has the electronic structure 2,8,8.

What is the group number of this element?

- A** I **B** III **C** VII **D** VIII

22 Which property is the same for sodium and copper?

- A colour
- B density at room temperature
- C melting point
- D state at room temperature

23 Three properties of element X are listed.

- X reacts with dilute hydrochloric acid to make hydrogen.
- X is formed when carbon is heated with an oxide of X.
- X does not react with water.

What is the position of X in the reactivity series?

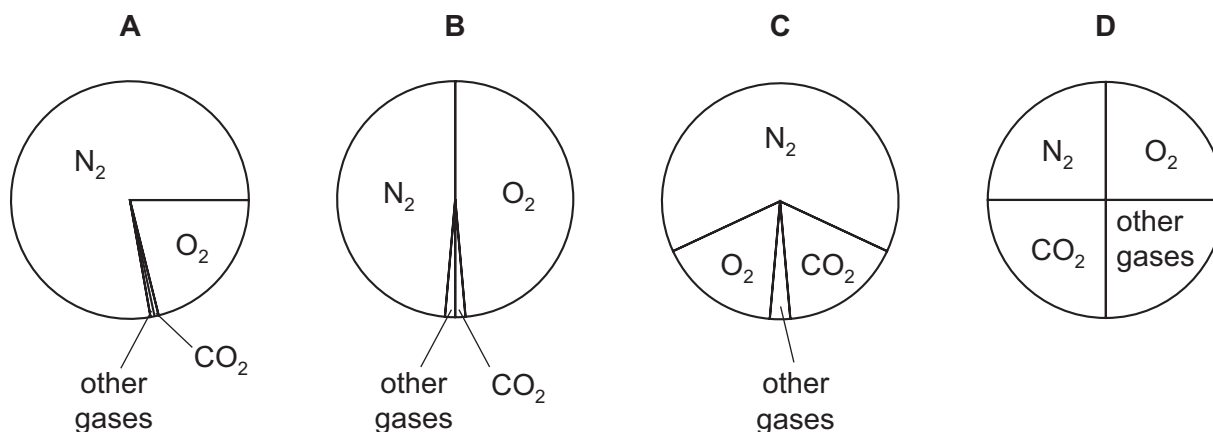
- A It is above sodium.
- B It is below copper.
- C It is below zinc but above copper.
- D It is between calcium and zinc.

24 Which processes are used in water treatment?

- 1 chlorination
- 2 cracking
- 3 filtration

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

25 Which pie chart shows the proportions of gases in clean air?



26 Which fraction obtained from petroleum by fractional distillation is used for making chemicals?

- A bitumen
- B gasoline
- C naphtha
- D refinery gas

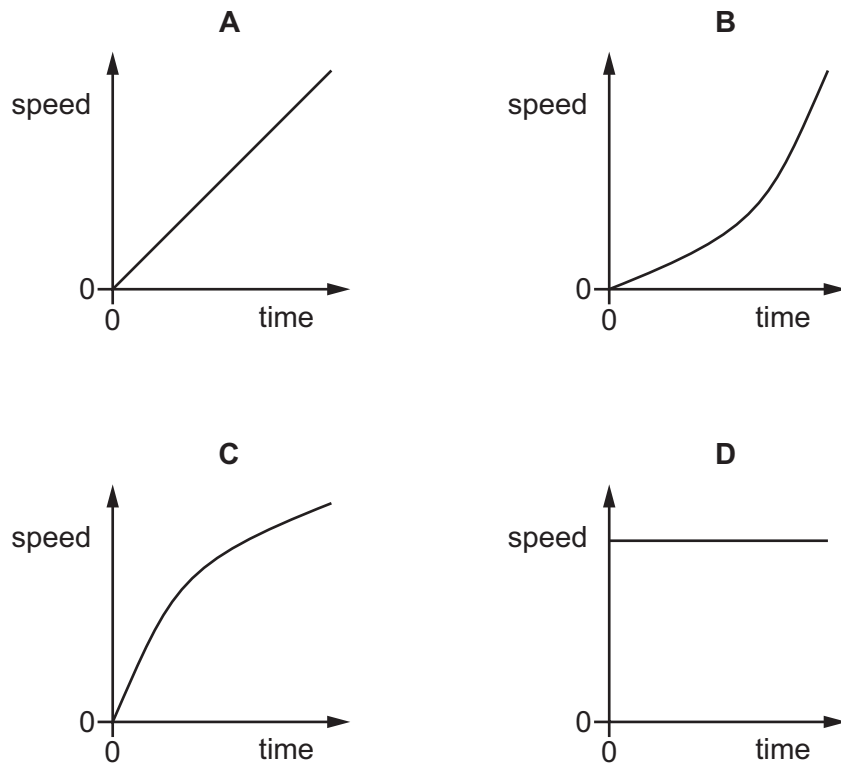
27 Which row about alkanes is correct?

	type of hydrocarbon	products of complete combustion
A	saturated	carbon dioxide and hydrogen
B	saturated	carbon dioxide and water
C	unsaturated	carbon dioxide and hydrogen
D	unsaturated	carbon dioxide and water

28 Which row shows apparatus used to measure length, time and volume?

	length	time	volume
A	measuring cylinder	metre rule	stop-clock
B	measuring cylinder	stop-clock	metre rule
C	metre rule	measuring cylinder	stop-clock
D	metre rule	stop-clock	measuring cylinder

29 Which speed–time graph represents the motion of an object that is moving with constant speed?



30 Samples of three liquids, X, Y and Z, each have a volume of 16 cm^3 .

The mass of each sample is shown.

sample of liquid	mass / g
X	13
Y	16
Z	19

Which liquids have a density less than 1.1 g/cm^3 ?

- A** X and Y **B** X only **C** Y and Z **D** Z only

31 Which object has a resultant force acting on it?

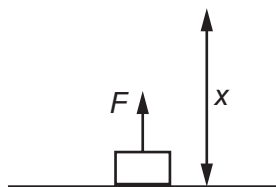
- A** an object moving at constant speed along a curved path
B an object moving at constant speed along a straight path
C an object moving at constant speed vertically upwards
D an object that is stationary

- 32 In three experiments, equal forces of magnitude F move the same block of wood through equal distances x .

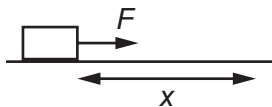
In experiment 1, the block is raised vertically.

In experiment 2, the block is moved horizontally.

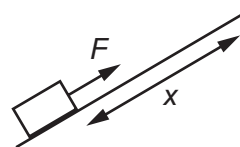
In experiment 3, the block is moved along a sloping board.



experiment 1



experiment 2



experiment 3

In each experiment, the block is moved at constant speed.

Which statement about the work done by the force in the experiments is correct?

- A The most work is done in experiment 1.
 - B The most work is done in experiment 2.
 - C The most work is done in experiment 3.
 - D The work done is the same in experiments 1, 2 and 3.
- 33 In which situation is energy **not** being transferred?
- A a book resting on a shelf
 - B an electric current lighting a lamp
 - C an electric kettle heating water
 - D sound travelling through air
- 34 The temperature of a gas increases.

What happens to the molecules of the gas?

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

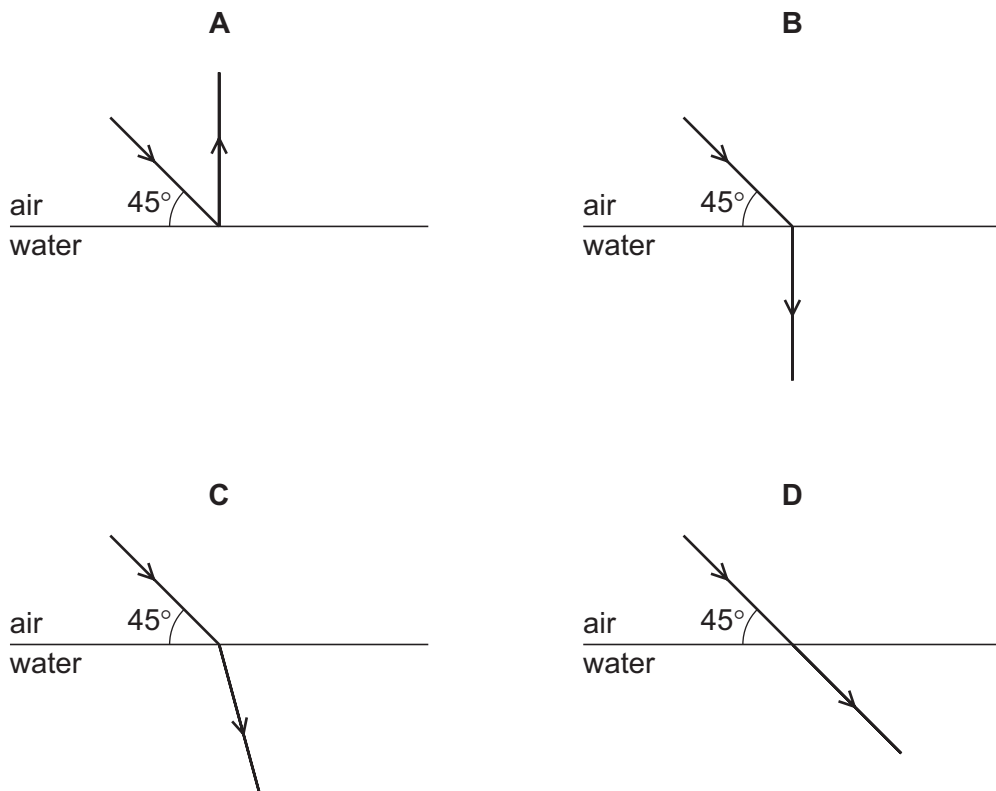
35 Energy is transferred from the Sun to the Earth through the vacuum of space.

Which method of energy transfer is involved?

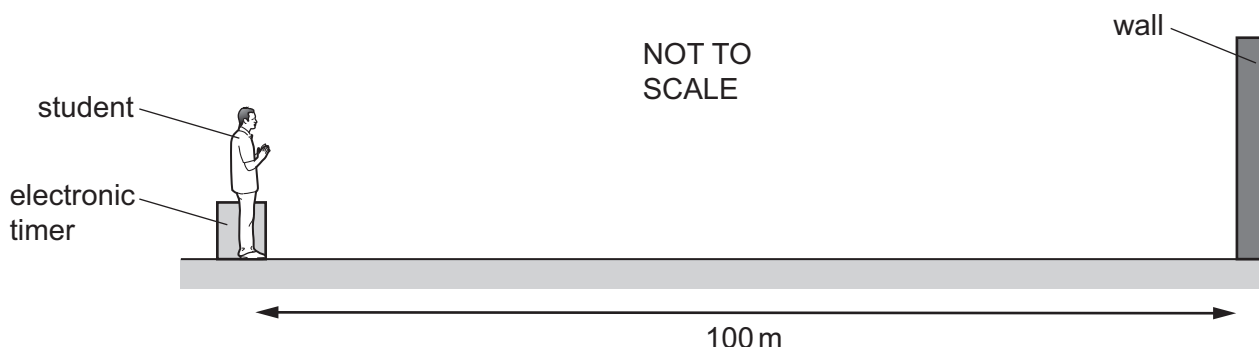
- A** conduction
- B** convection
- C** evaporation
- D** radiation

36 A ray of light in air strikes the surface of water at an angle of 45° .

Which diagram shows what happens to the ray after it strikes the surface?



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



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

Which calculation gives the speed of sound?

- A $\frac{200}{0.30}$ m/s B $\frac{200}{0.60}$ m/s C $\frac{100}{0.60}$ m/s D $\frac{100}{1.2}$ m/s
- 38 A resistor has a resistance of $4.5\ \Omega$. The resistor is connected to a cell and there is a current of 0.60 A in the resistor.
- What is the potential difference (p.d.) across the resistor?
- A 0.13 V B 2.7 V C 5.1 V D 7.5 V
- 39 Why are electrical devices **not** used near a sink containing hot water?
- A Hot water causes overheating in the cables.
 B Hot water causes the fuse to blow.
 C Water damages the insulation around the cables.
 D Water conducts electricity and can cause an electric shock.
- 40 A 240 V power supply produces a current of 8.0 A in a heater that has a resistance of $30\ \Omega$. The power transferred in the heater is 1.9 kW.

What is the rating of an appropriate fuse for the circuit?

- A 10 A B 2.0 kW C 1.8 kW D $30\ \Omega$

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The Periodic Table of Elements

Group																				
I	II											III	IV	V	VI	VII	VIII			
		1 H hydrogen 1																		
		Key atomic number atomic symbol name relative atomic mass																		
3 Li lithium 7	4 Be beryllium 9													5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19		
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		
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	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 —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganeson —			

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 —

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



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1 What are the characteristics of living organisms?

	excretion	growth	movement	nutrition	reproduction	respiration	sensitivity
A	x	✓	✓	✓	✓	✓	x
B	✓	x	x	✓	x	✓	✓
C	✓	✓	x	✓	✓	✓	✓
D	✓	✓	✓	✓	✓	✓	✓

2 Which row is correct for osmosis?

	requires a partially permeable membrane	involves the movement of water
A	no	no
B	no	yes
C	yes	no
D	yes	yes

3 Which name is given to proteins that function as biological catalysts?

- A** enzymes
- B** hormones
- C** solvents
- D** vitamins

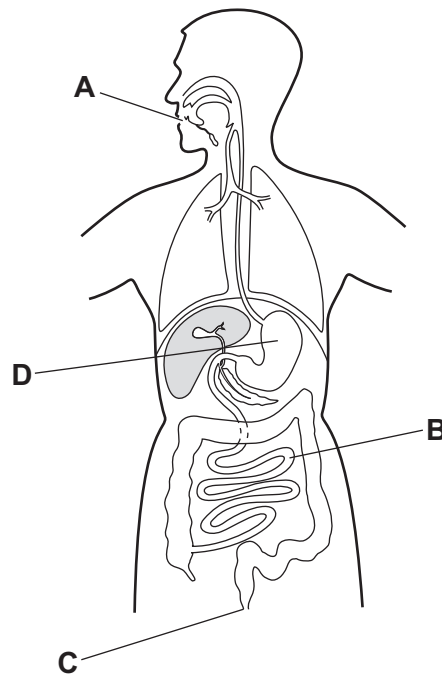
4 Which substance found in plant cells is needed for photosynthesis?

- A** chlorophyll
- B** glucose
- C** haemoglobin
- D** starch

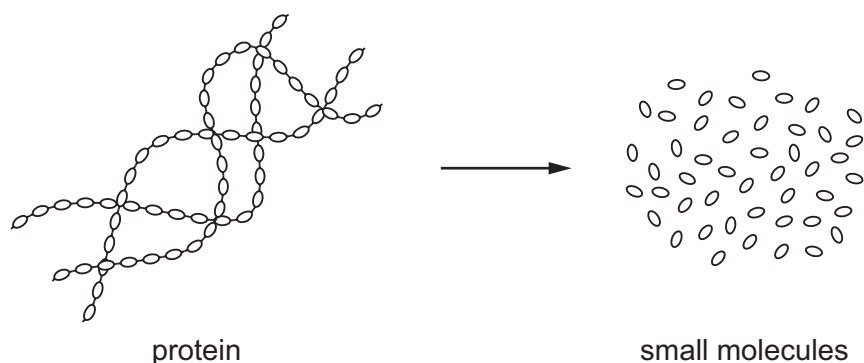
5 Which nutrient is needed for each function in the human body?

	to make red blood cells	for strong bones	for growth
A	calcium	iron	protein
B	calcium	protein	iron
C	iron	calcium	protein
D	iron	protein	calcium

6 Which region of the alimentary canal carries out ingestion?



- 7 The diagram shows what happens to proteins in the alimentary canal.



X is the type of digestion involved.

Y is a property of the small molecules produced.

Z is the name of the small molecules produced.

Which row represents X, Y and Z?

	X	Y	Z
A	chemical digestion	insoluble	fatty acids
B	chemical digestion	soluble	amino acids
C	mechanical digestion	insoluble	amino acids
D	mechanical digestion	soluble	fatty acids

- 8 Which environmental conditions result in the highest rate of transpiration from a plant?

	humidity	temperature
A	high	high
B	low	high
C	high	low
D	low	low

- 9 A student competes in a running race at school.

What is the effect on the student's rate and depth of breathing during the race?

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

- 10** A cat suddenly jumps in front of a person walking down a street. The person is shocked.

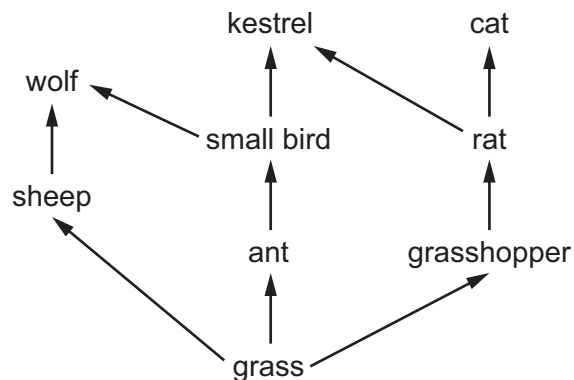
Which row shows the changes that occur?

	adrenaline level	pulse rate
A	unchanged	decreases
B	unchanged	increases
C	increases	decreases
D	increases	increases

- 11** Which statement about offspring produced by asexual reproduction is correct?

- A** The offspring are genetically different from one another.
- B** The offspring are genetically identical to their parent.
- C** The offspring are produced by two parents.
- D** The offspring are produced by the fusion of gametes.

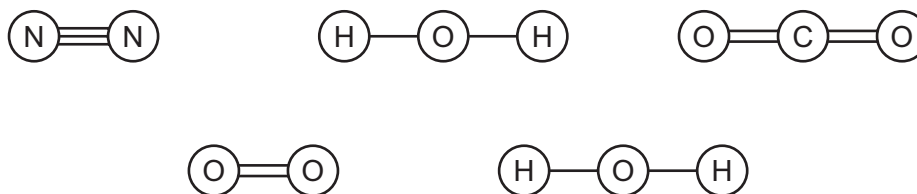
- 12** The diagram represents several food chains in a food web.



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

- A** 3
 - B** 4
 - C** 5
 - D** 9
- 13** What is an undesirable effect of deforestation?
- A** less carbon dioxide in the atmosphere
 - B** less extinction
 - C** less flooding
 - D** loss of soil

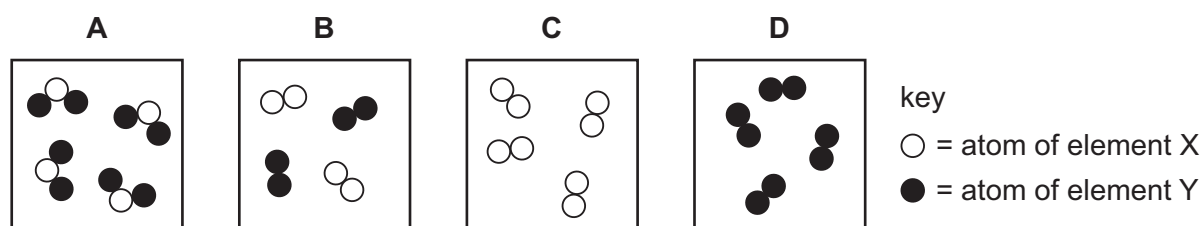
14 The diagram shows representations of some substances.



Which row identifies the total number of atoms and the total number of molecules in this diagram?

	number of atoms	number of molecules
A	4	5
B	10	4
C	13	4
D	13	5

15 Which diagram represents a mixture of elements?



16 Sodium chloride is an ionic compound made by reacting sodium with chlorine.

Which statement about the formation of sodium chloride is correct?

- A** Sodium atoms and chlorine atoms share pairs of electrons.
- B** Sodium atoms gain 1 electron.
- C** Chlorine atoms lose 1 electron.
- D** Sodium atoms lose 1 electron.

17 What is the formula of nitric acid?

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

18 Which row identifies the electrode products in the electrolysis of the named electrolyte?

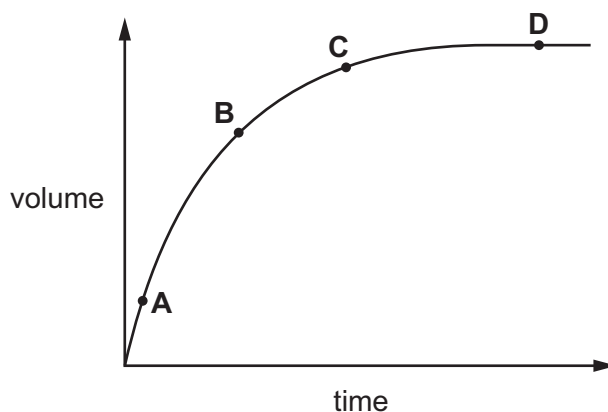
	electrolyte	product at anode	product at cathode
A	concentrated aqueous sodium chloride	chlorine	sodium
B	dilute sulfuric acid	hydrogen	oxygen
C	dilute sulfuric acid	sulfur dioxide	hydrogen
D	molten lead(II) bromide	bromine	lead

19 Which row describes an exothermic reaction?

	temperature of the reaction mixture	direction of energy transfer
A	decreases	from the surroundings
B	decreases	to the surroundings
C	increases	from the surroundings
D	increases	to the surroundings

20 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?



21 What is a reduction process?

- A** the combustion of a fuel
- B** the thermal decomposition of calcium carbonate
- C** the extraction of copper from copper oxide
- D** the reaction between an acid and an alkali

- ## What is X?

- 23** Part of the Periodic Table is shown.

[illegible]

A 1 and 2 **B** 2 and 3 **C** 4 and 6 **D** 5 and 6

- | | Group I elements | Group VII elements |
|----------|--|--|
| A | are solid at room temperature | are solid, liquid or gas at room temperature |
| B | are poor conductors of heat and electricity | are good conductors of heat and electricity |
| C | consist of negatively charged ions | consist of diatomic molecules |
| D | gain electrons when they react with Group VII elements | lose electrons when they react with Group I elements |

- A** It is a compound containing a metal and a non-metal.
- B** It is a compound containing two metals.
- C** It is a mixture of a metal with other elements.
- D** It is a pure metal.

26 Which statements about water are correct?

- 1 In a water molecule, the oxygen atom has eight electrons in its outer shell.
- 2 Water changes the colour of cobalt(II) chloride to blue.
- 3 In water treatment, water is filtered to remove dissolved impurities.
- 4 In water treatment, chlorine is added to kill bacteria.

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

27 Butane is a hydrocarbon.

What are the products of the complete combustion of butane?

- A** carbon and hydrogen
B carbon dioxide and hydrogen
C carbon dioxide and water
D carbon dioxide only

28 A student determines the volume of a laboratory notebook.

Which measuring instruments are used?

- A** a clock and a measuring cylinder
B a measuring cylinder and a ruler
C a measuring cylinder only
D a ruler only

29 A student wants to find the period of a pendulum. He determines the time taken for the pendulum to make one complete oscillation. He repeats the measurement several times.

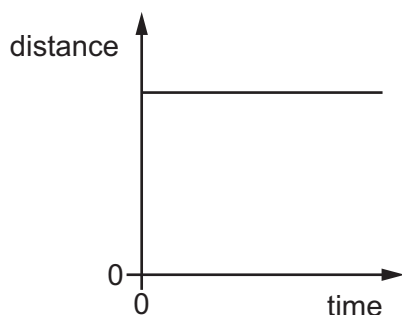
His results are shown in the table.

measurement	1	2	3	4	5	6
time taken / s	1.6	1.4	1.4	1.5	1.4	1.7

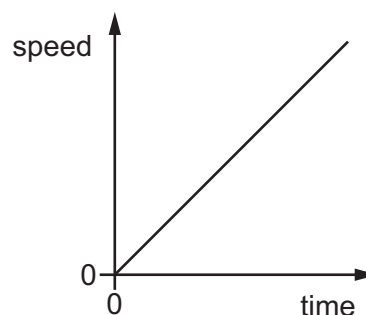
What is the average value for the period of the pendulum?

A 1.4 s **B** 1.5 s **C** 1.7 s **D** 9.0 s

- 30 Graph 1 is a distance–time graph. Graph 2 is a speed–time graph.



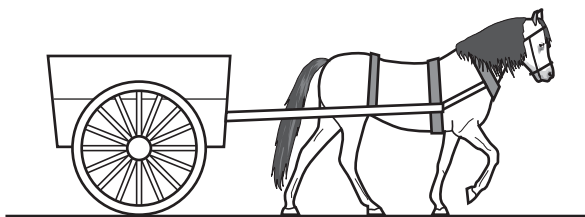
graph 1



graph 2

Which graphs represent the motion of a car that is moving at constant speed?

- A both graph 1 and graph 2
 - B graph 1 only
 - C graph 2 only
 - D neither graph 1 nor graph 2
- 31 A cart is pulled along a horizontal road by a horse.



The horse does work on the cart. The work done depends on the force exerted on the cart and on one other quantity.

What is the other quantity?

- A the distance between the horse and the cart
 - B the distance moved by the cart
 - C the height of the horse
 - D the weight of the cart
- 32 As an electric car starts moving, the car motor transfers energy to the wheels.
- Which process is involved in this transfer of energy?
- A work done by heating in the motor
 - B work done by the frictional force between the wheels and the road
 - C work done by the mechanical force from the motor
 - D work done by a decrease in gravitational potential energy

33 Which energy resource is non-renewable?

- A** geothermal
- B** hydroelectric
- C** nuclear
- D** wind

34 Some of the liquid in a beaker starts to evaporate.

What happens to the temperature of the liquid remaining and why does the temperature change?

- A** The temperature decreases because more-energetic molecules escape.
- B** The temperature decreases because there are fewer molecules remaining.
- C** The temperature increases because less-energetic molecules escape.
- D** The temperature increases because there are fewer molecules remaining.

35 A glass bottle is half full of water.

The glass bottle has a metal cap that fits tightly over the top of the bottle and is difficult to unscrew.

After the glass bottle and the metal cap are immersed in hot water, the cap unscrews easily.

Why is this?

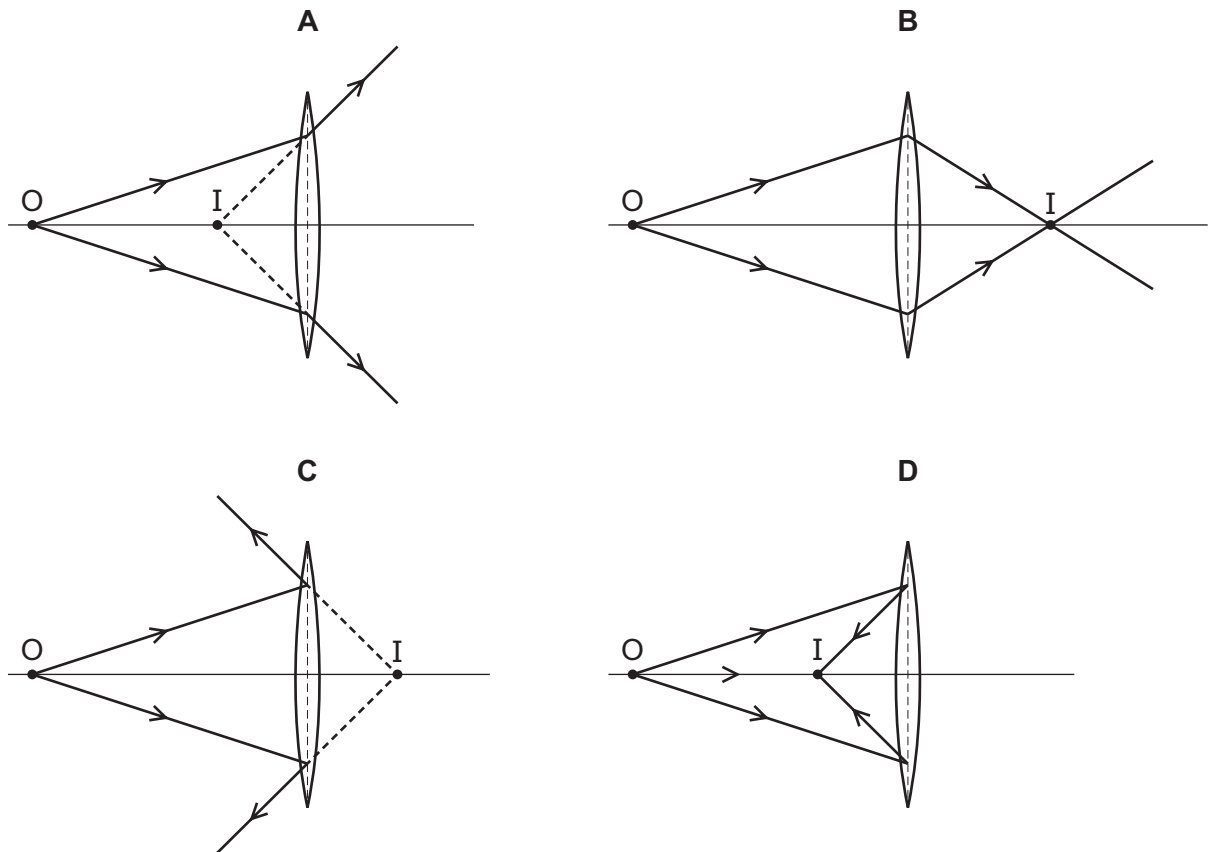
- A** The air inside the glass bottle expands.
- B** The glass bottle expands more than the metal cap.
- C** The metal cap expands more than the glass bottle.
- D** The water in the glass bottle expands.

36 Energy is transferred from the Sun through the vacuum of space to all the planets in the Solar System.

How is the energy transferred?

- A** by conduction, convection and radiation
- B** by conduction only
- C** by convection only
- D** by radiation only

- 37 Which diagram shows how a converging lens forms a real image of object O at the point labelled I?



- 38 Which row gives the unit for potential difference (p.d.) and the unit for electromotive force (e.m.f.)?

	p.d.	e.m.f.
A	J	N
B	J	V
C	V	N
D	V	V

- 39 Two heaters are connected in parallel to a socket that is protected by a fuse.

The current in each heater is 9.0 A.

What is a suitable rating for the fuse?

- A** 3 A **B** 5 A **C** 9 A **D** 20 A

40 Two lamps can be connected to a power supply either in series or in parallel.

Which statement is correct?

- A** In a series circuit, the current from the power supply is greater than the current in each lamp.
- B** Lamps connected in parallel can be controlled separately by using switches.
- C** The combined resistance of lamps in series is less than when they are connected in parallel.
- D** When one lamp in a series circuit stops working, the other lamp always remains lit.

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The Periodic Table of Elements

Group																				
I	II											III	IV	V	VI	VII	VIII			
		1 H hydrogen 1																		
		Key atomic number atomic symbol name relative atomic mass																		
3 Li lithium 7	4 Be beryllium 9													5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19		
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	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 —	108 Hs hassium —	109 Mt meitnerium —	110 Ds darmstadtium —	111 Rg roentgenium —	112 Cn copernicium —	113 Nh nihonium —	114 Fl flerovium —	115 Mc moscovium —	116 Lv livermorium —	117 Ts tennessine —	118 Og oganeson —			

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium —	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium —	94 Pu plutonium —	95 Am americium —	96 Cm curium —	97 Bk berkelium —	98 Cf californium —	99 Es einsteinium —	100 Fm fermium —	101 Md mendelevium —	102 No nobelium —	103 Lr lawrencium —

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



Cambridge IGCSE™

COMBINED SCIENCE

Paper 1 Multiple Choice (Core)

0653/13

May/June 2024

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- There are **forty** questions on this paper. Answer **all** questions.
- For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in soft pencil on the multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages. Any blank pages are indicated.



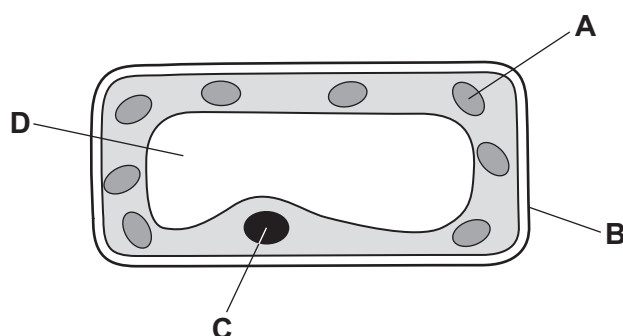
- 1 A plant bends towards the light.

Which characteristics of living organisms does this show?

- A movement and nutrition
- B movement and respiration
- C movement and sensitivity
- D sensitivity and respiration

- 2 The diagram shows a plant cell as seen under a light microscope.

Which labelled structure is a chloroplast?



- 3 What are features of diffusion?

	net movement of particles from a higher to a lower concentration	requires a partially permeable membrane	key ✓ = yes X = no
A	✓	✓	
B	✓	X	
C	X	✓	
D	X	X	

- 4 A student tests a biological molecule using biuret solution. The solution turns purple.

Which elements make up the biological molecule?

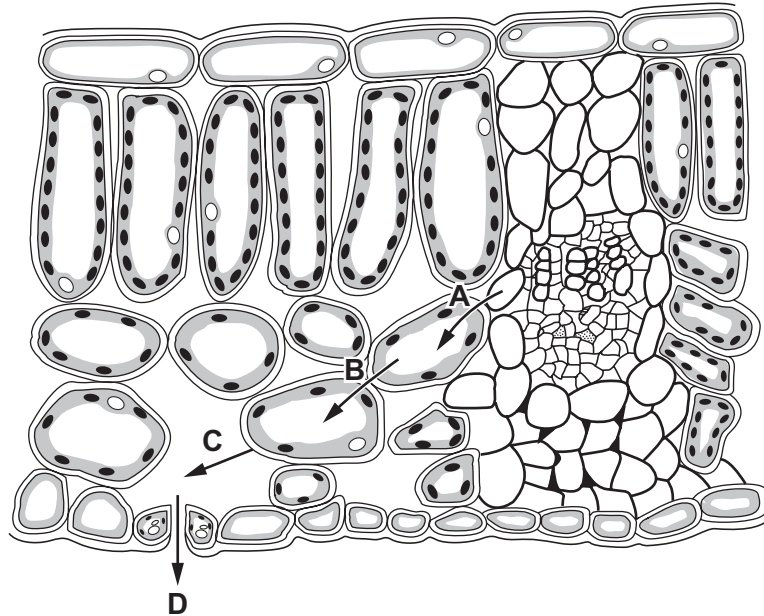
- A carbon, hydrogen, oxygen and nitrogen
- B carbon and hydrogen only
- C carbon, hydrogen and oxygen only
- D carbon, hydrogen and nitrogen only

- 5 What is the word equation for photosynthesis?
- A carbon dioxide + oxygen → glucose + water
- B carbon dioxide + water → glucose + oxygen
- C glucose + oxygen → carbon dioxide + water
- D glucose + water → carbon dioxide + oxygen
- 6 Which statement about a balanced diet in humans is correct?
- A It does **not** contain fibre.
- B It has a variety of food types to provide all the necessary nutrients.
- C It includes high amounts of fats and sugars to provide energy.
- D It means eating the same foods each day.
- 7 Which row shows the type of digestion and describes the change needed to allow the absorption of food molecules into the blood?

	type of digestion	change
A	chemical	large molecules to small, insoluble molecules
B	chemical	large molecules to small, soluble molecules
C	mechanical	large molecules to small, soluble molecules
D	mechanical	large molecules to small, insoluble molecules

- 8 The diagram shows a section through a leaf.

Which arrow represents the evaporation of water during transpiration?



- 9 The table shows differences in composition between some of the gases in inspired and expired air.

Which row shows the correct composition for these gases?

	inspired air	expired air
A	more carbon dioxide	more water vapour
B	more oxygen	less water vapour
C	less carbon dioxide	more water vapour
D	less oxygen	less water vapour

- 10 Which row is correct for the hormone adrenaline?

	effect on blood glucose concentration	effect on the pulse rate
A	lowered	decreased
B	lowered	increased
C	raised	decreased
D	raised	increased

11 A plant is grown without light.

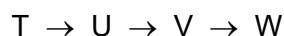
Which tropic responses are shown by the roots and shoots of the plant?

	root response	shoot response
A	gravitropism	gravitropism
B	gravitropism	phototropism
C	phototropism	gravitropism
D	phototropism	phototropism

12 What describes the transfer of pollen grains from the anther to the stigma?

- A** asexual reproduction
- B** fertilisation
- C** germination
- D** pollination

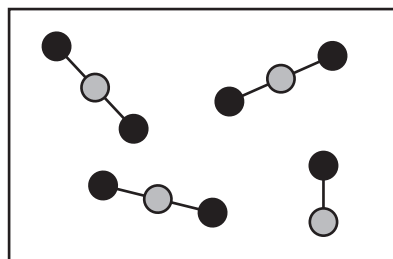
13 The diagram represents four organisms in a food chain.



Which organisms are consumers?

- A** T, U and V
- B** T, U and W
- C** T, V and W
- D** U, V and W

14 The diagram represents a mixture of carbon dioxide, CO₂, 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.

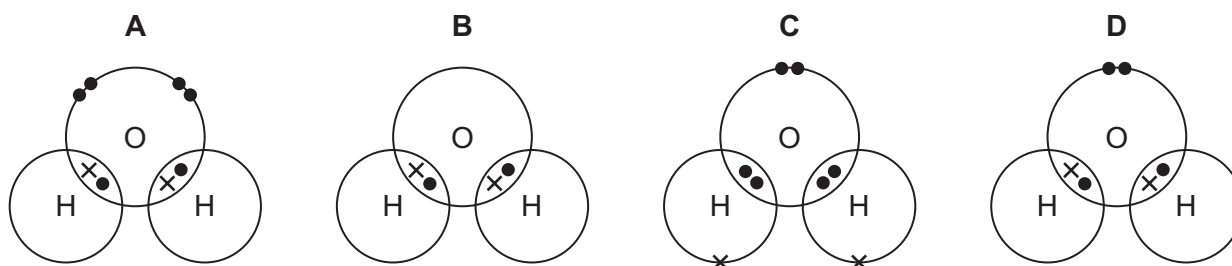
15 Which method is used to separate an insoluble salt from a mixture of the salt and water?

- A crystallisation
- B distillation
- C filtration
- D fractional distillation

16 Which row about elements and compounds is correct?

	elements	compounds
A	are metals only	contain ionic or covalent bonds
B	are non-metals only	contain covalent bonds only
C	are metals or non-metals	contain ionic bonds only
D	are metals or non-metals	contain ionic or covalent bonds

17 Which dot-and-cross diagram represents the outer shell electrons in a water molecule?

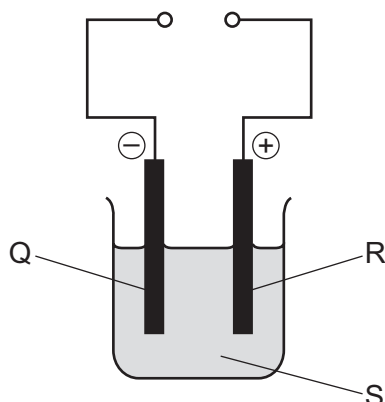


18 Urea, $(\text{NH}_2)_2\text{CO}$, is used as a fertiliser.

How many atoms or molecules are represented by the formula for urea?

- A atoms: nitrogen, 1; hydrogen, 2; carbon, 2; oxygen, 2
- B atoms: nitrogen, 2; hydrogen, 4; carbon, 1; oxygen, 1
- C molecules: ammonia, 1; carbon monoxide, 2
- D molecules: ammonia, 2; carbon monoxide, 1

19 The apparatus used in an electrolysis experiment is shown.



Which row identifies Q, R and S?

	Q	R	S
A	cathode	anode	electrolyte
B	cathode	anode	electrode
C	anode	cathode	electrolyte
D	anode	cathode	electrode

20 Magnesium reacts with dilute hydrochloric acid forming hydrogen gas.

Which measurements are needed to determine the rate of the reaction?

- 1 the temperature of the acid
- 2 the volume of the acid
- 3 the time taken for the magnesium to react
- 4 the total volume of hydrogen made

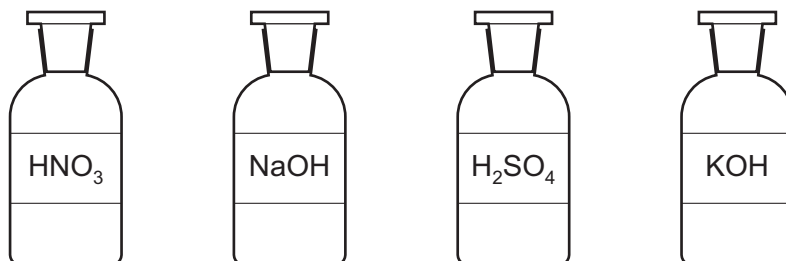
A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

21 When iron rusts, iron(III) oxide is formed.

What is the meaning of (III) in iron(III) oxide?

- A** It is the number of iron ions in the formula for iron(III) oxide.
- B** It is the ratio of iron ions to oxygen ions.
- C** It is the oxidation state of iron ions in iron(III) oxide.
- D** It is the pH of iron ions in iron(III) oxide.

22 A student mixes a dilute acid with separate samples from the four bottles shown.



Which samples react with the dilute acid?

	HNO_3	NaOH	H_2SO_4	KOH
A	✓	✗	✗	✗
B	✓	✗	✓	✗
C	✗	✓	✗	✗
D	✗	✓	✗	✓

key

✓ = reacts

✗ = does **not** react

23 Which row identifies the correct test and test result for the named gases?

	chlorine	ammonia	oxygen
A	turns damp litmus paper blue	turns damp litmus paper red	'pops' with a lighted splint
B	turns damp litmus paper red	turns damp litmus paper blue	'pops' with a lighted splint
C	bleaches damp litmus paper	turns damp litmus paper blue	relights a glowing splint
D	bleaches damp litmus paper	turns damp litmus paper red	relights a glowing splint

24 Which statement about transition elements is correct?

- A** Their compounds are generally colourless.
- B** Their compounds often act as catalysts.
- C** They are metals with low densities.
- D** They are non-metals with high melting points.

25 Which statement about the noble gases is correct?

- A They form diatomic molecules.
- B They all have the same number of electron shells.
- C They are reactive so they are stored under oil.
- D They have full outer shells of electrons.

26 Information about metals P, Q and R is shown.

When P is added to cold water, a violent reaction occurs producing lilac flames.

Q does **not** react with dilute hydrochloric acid.

R reacts with cold water to produce hydrogen.

Which row identifies these metals?

	P	Q	R
A	potassium	copper	calcium
B	potassium	aluminium	magnesium
C	sodium	aluminium	calcium
D	sodium	copper	magnesium

27 Which statements about alkanes are correct?

- 1 They are generally unreactive.
- 2 They are unsaturated because they contain only single covalent bonds.
- 3 They contain carbon, hydrogen and oxygen.
- 4 They form carbon dioxide and water during complete combustion.

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

28 A student measures the length of five different pencils.

The longest pencil has length 16.0 cm and the shortest pencil has length 8.0 cm.

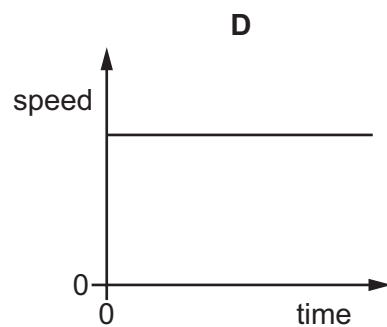
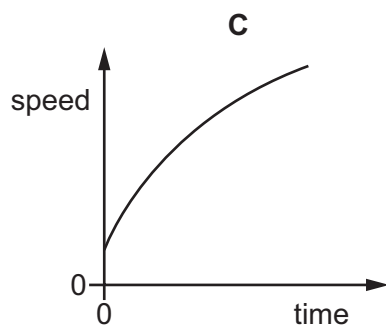
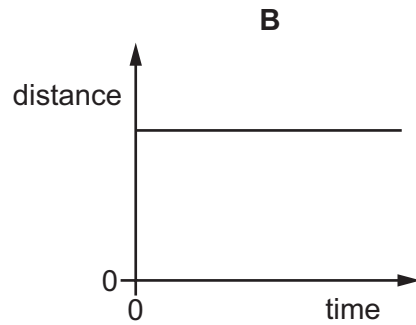
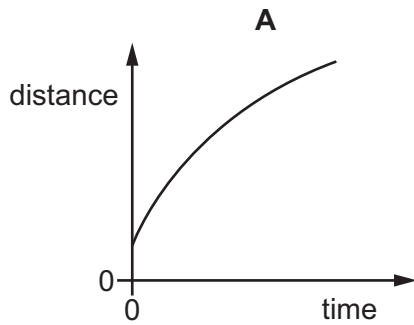
The lengths of the other pencils are 12.5 cm, 12.5 cm and 13.1 cm.

What is the average length of the pencils?

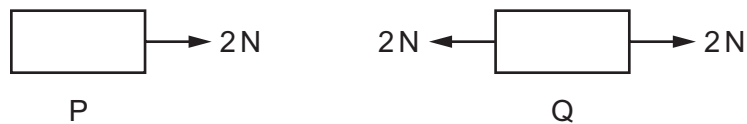
- A 12.0 cm B 12.4 cm C 12.5 cm D 12.7 cm

29 The diagrams show two distance–time graphs and two speed–time graphs.

Which graph represents the motion of an object that is moving with constant speed?



30 P and Q are objects that are travelling in a straight line. The diagram shows the only forces acting on P and Q.



Which row describes the motion of P and the motion of Q?

	P	Q
A	accelerating	accelerating
B	accelerating	constant speed
C	constant speed	accelerating
D	constant speed	constant speed

31 A box is lifted at a constant speed.

Which quantities affect the amount of work done in lifting the box?

	time taken to lift the box	height lifted
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = affects work done

✗ = does **not** affect work done

32 A car is driven to the top of a hill.

Which single change would **decrease** the power needed by the car?

- A** increasing the height of the hill
- B** increasing the mass of the car
- C** increasing the time taken to go up the hill
- D** increasing the weight of the car

33 Which method of generating electricity uses a non-renewable energy resource?

- A** nuclear power station
- B** solar panel
- C** hydroelectric power station
- D** wind turbine

34 A solid is heated.

Which two properties of the solid **both** change?

- A** density and volume
- B** density and weight
- C** mass and volume
- D** mass and weight

- 35** Which statement explains why ice cubes floating at the top of warm water cause all of the water to cool?
- A** Convection causes cold water at the top to sink.
 - B** Convection causes the water around the ice cubes to freeze.
 - C** Ice cubes are good thermal insulators.
 - D** Ice cubes are good emitters of thermal radiation.
- 36** An object is placed in front of a vertical plane mirror.
- The object is then moved further away from the mirror.
- What happens to the image?
- A** It becomes larger and moves further from the mirror.
 - B** It becomes larger but stays the same distance from the mirror.
 - C** It stays the same size but moves further from the mirror.
 - D** It stays the same size and stays the same distance from the mirror.
- 37** Light in air hits the surface of a transparent glass block at an angle of incidence of 45° .
- In which direction does the light then travel?
- A** along the surface of the glass
 - B** in the opposite direction to its original direction
 - C** into the glass in a different direction
 - D** into the glass in its original direction
- 38** Which quantity is measured in volts?
- A** energy
 - B** potential difference (p.d.)
 - C** power
 - D** resistance

- 39** The current in a resistor and the potential difference (p.d.) across it are recorded.

Which expression is used to calculate the resistance of the resistor?

- A** $\frac{\text{current}}{\text{p.d.}}$
- B** $\text{current} \times (\text{p.d.})^2$
- C** $\text{p.d.} \times \text{current}$
- D** $\frac{\text{p.d.}}{\text{current}}$

- 40** A heater carries a current of 8.0 A when it is in normal use.

What is the rating of a suitable fuse to protect the heater circuit?

- A** 1 A **B** 5 A **C** 7 A **D** 13 A

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	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 —

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