Cambridge Assessment International Education

Cambridge O Level

COMBINED SCIENCE **5129/12**

Paper 1 Multiple Choice **May/June 2023**

1 hour

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 **20** pages. Any blank pages are indicated.

1 Which cell structure is present in a red blood cell?

A cell membrane

B cell wall

C nucleus

D vacuole

2 Which statement is correct for most enzymes within organisms?

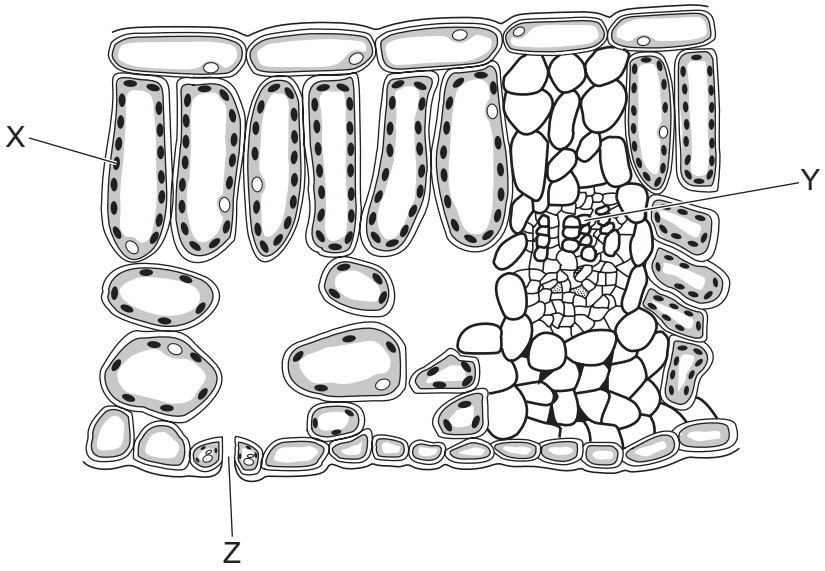
A produced inside a cell and controls metabolic activity of a target organ

B produced inside a cell and controls metabolic activity within that cell

C produced outside cells and controls metabolic activity of a target organ

D produced outside cells and controls metabolic activity within a cell

3 The diagram shows a cross-section of a leaf.



In which structures do photosynthesis and gas exchange occur?

	photosynthesis	gas exchange
A	X only	X and Z
B	X only	Z only
C	Y only	Z only
D	Y only	X and Z

4 After starch is ingested, in which order do these processes occur?

A absorption → assimilation → digestion

B absorption → digestion → egestion

C digestion → absorption → assimilation

D digestion → assimilation → absorption

5 What is the pathway of diffusion of carbon dioxide during gaseous exchange in the lungs?

A alveolar wall → alveolus → blood → capillary wall

B blood → capillary wall → alveolar wall → alveolus

C capillary wall → blood → alveolus → alveolar wall

D alveolus → alveolar wall → capillary wall → blood

6 Which definition of respiration is correct?

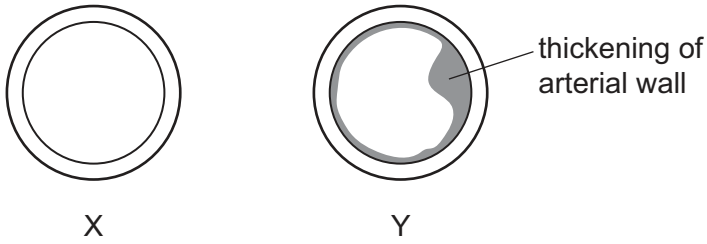
A the breakdown of food substances in the presence of oxygen

B the movement of the ribs and diaphragm

C the production of lactic acid in muscles during exercise

D the release of energy from glucose in living cells

7 Diagrams X and Y show sections of a coronary artery.



Which factors could be responsible for the condition shown in diagram Y?

1 age

2 exercise

3 high fibre diet

4 smoking

5 stress

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

8 Which part of the body is most damaged by smoking?

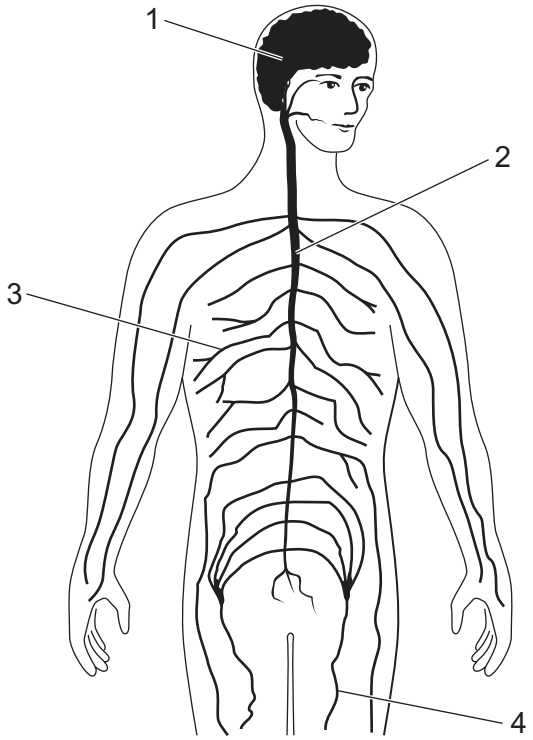
A the sensitive tissues of the nose

B the digestive system

C the gaseous exchange surfaces of the lungs

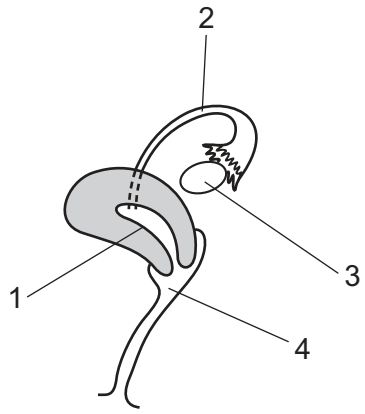
D the surface of the eyes

9 Which labelled parts form part of the central nervous system (CNS)?



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

10 The diagram shows a side view of the female reproductive system.



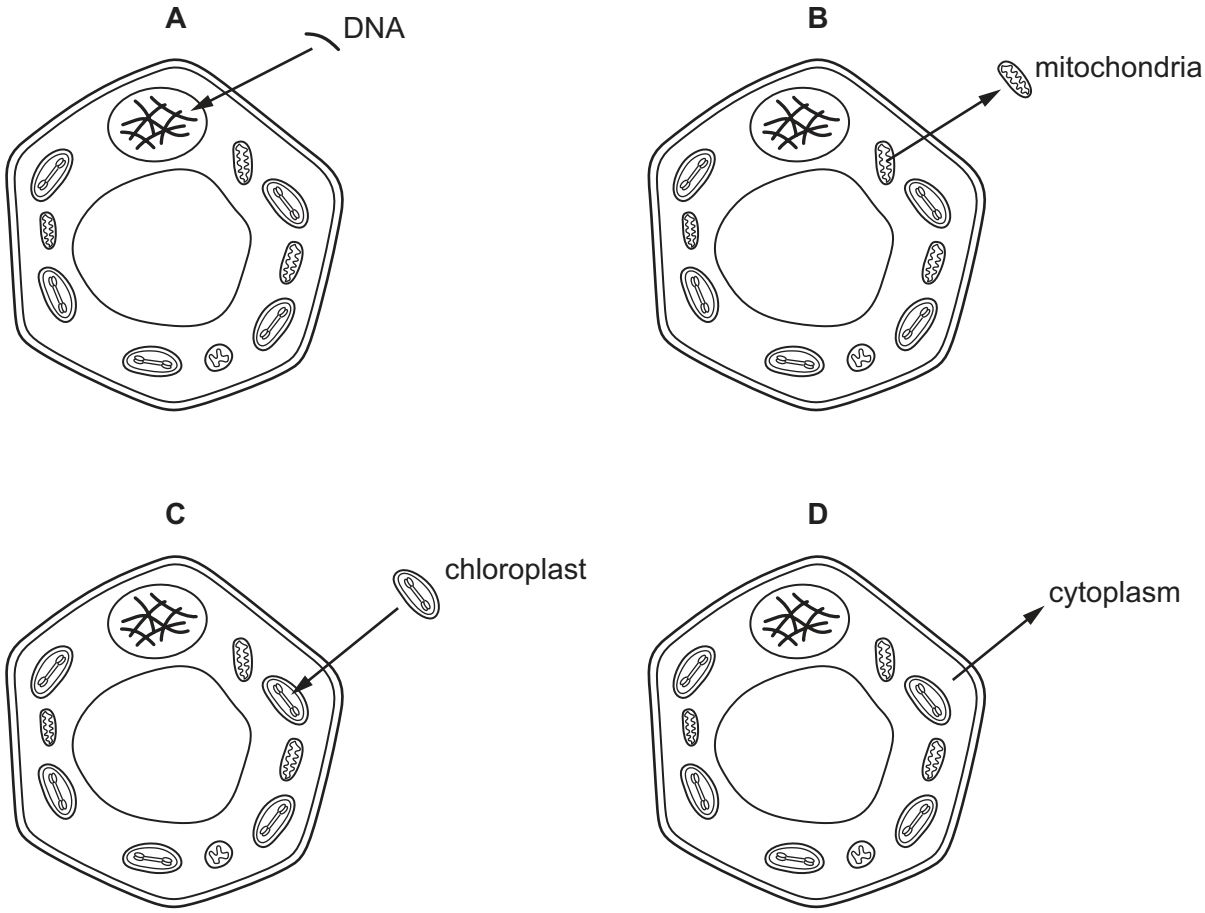
Which row shows the location where implantation happens and the location where zygotes are formed?

	where implantation happens	where zygotes are formed
A	2	2
B	1	3
C	2	3
D	1	2

[Turn over

11 When a cell undergoes genetic modification, material is either added or removed.

Which arrow correctly shows what happens during genetic modification in a plant cell?



12 The food chain shows the number of organisms living on or feeding from one tree.

At which level is the greatest amount of energy stored?

level **A** one tree with thousands of leaves → level **B** 2000 small insects → level **C** 100 spiders → level **D** 2 hunting birds

13 Tropical rainforests are being destroyed by human activity.

What is the most likely result of cutting down the trees?

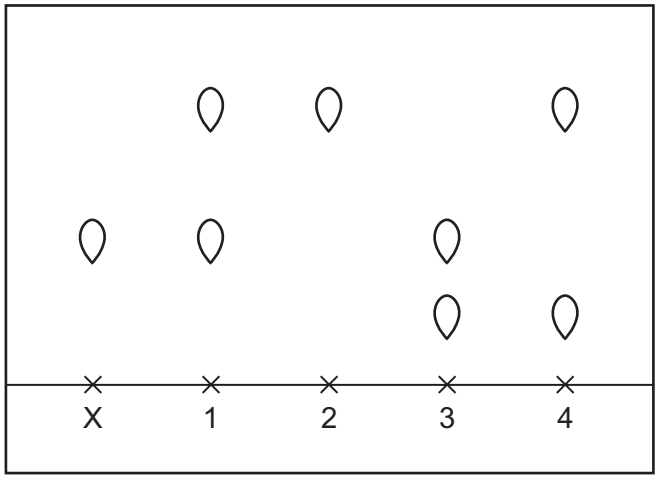
A more carbon dioxide and less oxygen in the atmosphere

B more carbon dioxide and more oxygen in the atmosphere

C less oxygen and more water vapour in the atmosphere

D more carbon dioxide and more water vapour in the atmosphere

14 The chromatogram shown is used to test whether any of four food colourings, 1, 2, 3 and 4, contain a dye X.



Which food colourings contain dye X?

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

15 Which row describes an electron and a neutron?

	electron	neutron
A	relative charge is 0	relative mass is negligible
B	relative charge is –1	relative mass is 1
C	relative mass is negligible	relative charge is +1
D	relative mass is 1	relative charge is 0

16 Which statement about the formation of sodium chloride from metallic sodium and non-metallic chlorine is correct?

A Sodium atoms gain electrons and chlorine atoms lose electrons to form covalent bonds.

B Sodium atoms gain electrons and chlorine atoms lose electrons to form ionic bonds.

C Sodium atoms lose electrons and chlorine atoms gain electrons to form covalent bonds.

D Sodium atoms lose electrons and chlorine atoms gain electrons to form ionic bonds.

17 Calcium hydroxide contains the ions Ca^{2+} and OH^-.

Which row shows the number of ions in the formula of calcium hydroxide?

	Ca^{2+}	OH^-
A	1	1
B	1	2
C	2	1
D	2	2

18 Which equation represents an endothermic reaction?

A $C_8H_{18} \rightarrow C_6H_{14} + C_2H_4$

B $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$

C $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

D $HCl + NaOH \rightarrow NaCl + H_2O$

19 Which statement about the role of catalysts in a chemical reaction is correct?

A Catalysts increase the concentration of reactants.

B Catalysts increase the total amount of energy released by a reaction.

C Catalysts decrease the number of collisions in a reaction.

D Catalysts remain unchanged at the end of a reaction.

20 Which test and result identifies oxygen?

	test	result
A	limewater	turns milky
B	glowing splint	relights
C	lighted splint	pop sound
D	bromine water	bromine decolourises

21 The table shows the pH value of five soil samples.

soil sample	pH value
P	8.0
Q	7.5
R	7.0
S	6.5
T	6.0

Cabbages grow best in alkaline soil.

In which soil samples does cabbage grow best?

A P and Q **B** Q and T **C** R and P **D** S and T

22 Element X is a soft metal which melts at a low temperature.

How does element X react with water?

A It does not react with cold water but does react with steam.

B It does not react with water.

C It reacts slowly with cold water.

D It reacts violently with cold water.

23 Fluorine, F, is placed at the top of Group VII in the Periodic Table.

Some properties of the other members of the group are shown.

	melting point / °C	boiling point / °C	colour
chlorine, Cl	–101	–34.7	yellow / green
bromine, Br	–7.2	58.8	red / brown
iodine, I	114	184	purple / black

Which description of fluorine at room temperature is correct?

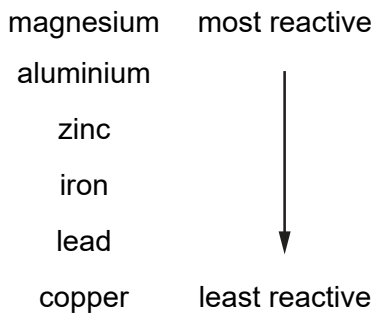
A a black solid

B a colourless liquid

C a yellow gas

D a yellow liquid

24 The order of reactivity of some metals is shown.



Which equation shows a reaction that does occur?

A copper + zinc oxide $\rightarrow$ copper(II) oxide + zinc

B iron(III) oxide + lead $\rightarrow$ lead(II) oxide + iron

C magnesium + zinc oxide $\rightarrow$ magnesium oxide + zinc

D magnesium oxide + aluminium $\rightarrow$ magnesium + aluminium oxide

25 Four statements about air pollutants are listed.

1 Particulates increase the risk of cancer.

2 Toxic gases are formed by burning plastics.

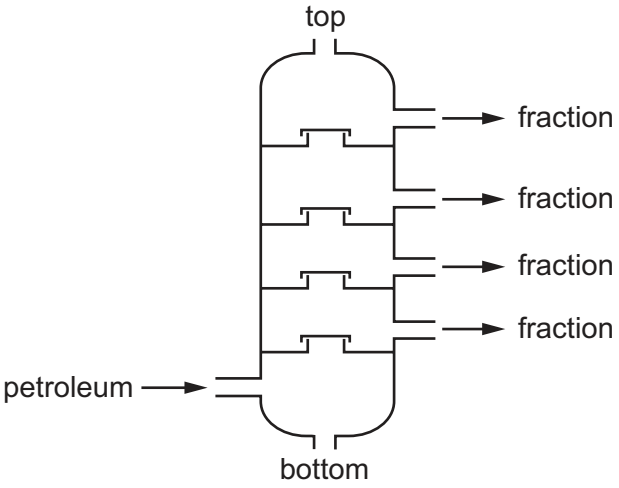
3 Carbon monoxide causes global warming.

4 Methane is a toxic gas.

Which statements are correct?

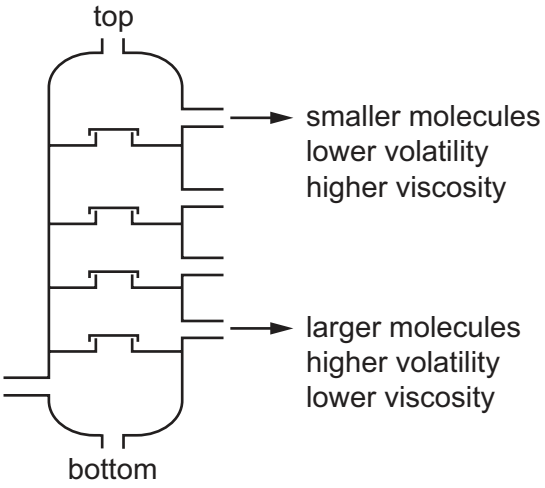
A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

26 Petroleum is separated into different hydrocarbon fractions in a fractionating column, as shown.

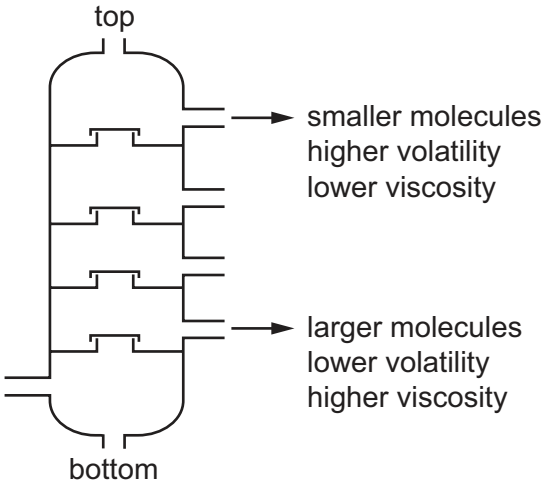


Which diagram shows the properties of the fractions collected in different parts of the column?

A



B



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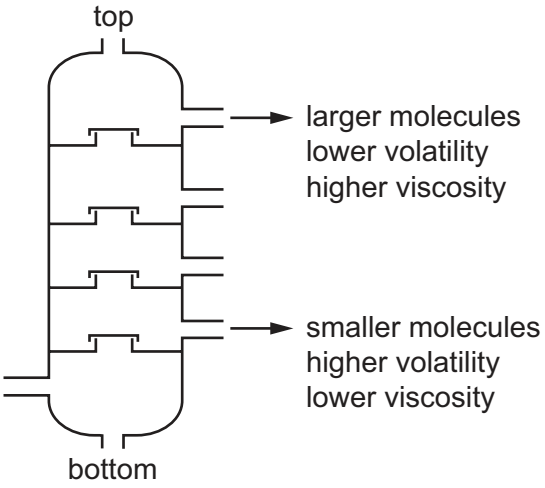
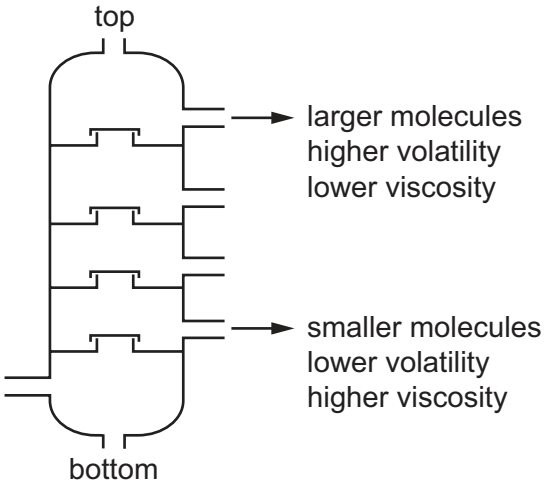


D



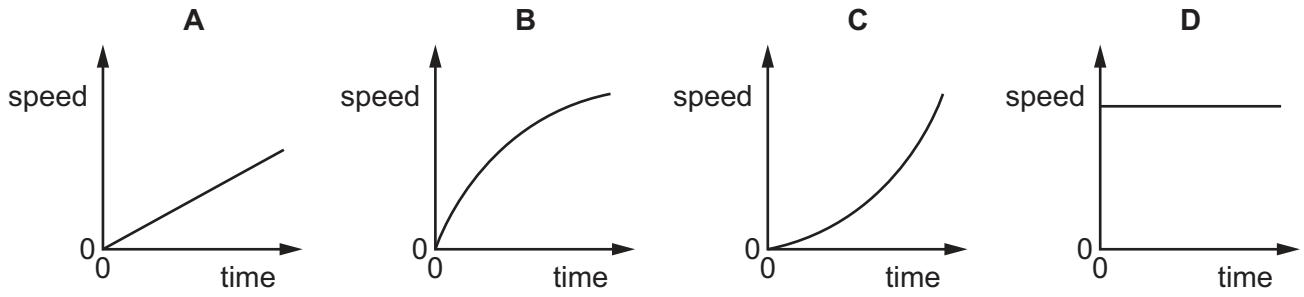
27 The molecular formulae for four hydrocarbon molecules, W, X, Y and Z, are shown.

C_3H_6	C_4H_{10}	C_3H_8	C_4H_8
W	X	Y	Z

Which molecules change aqueous bromine from yellow-brown to colourless?

A W and Y **B** W and Z **C** X and Y **D** X and Z

28 Which graph shows constant non-zero acceleration?



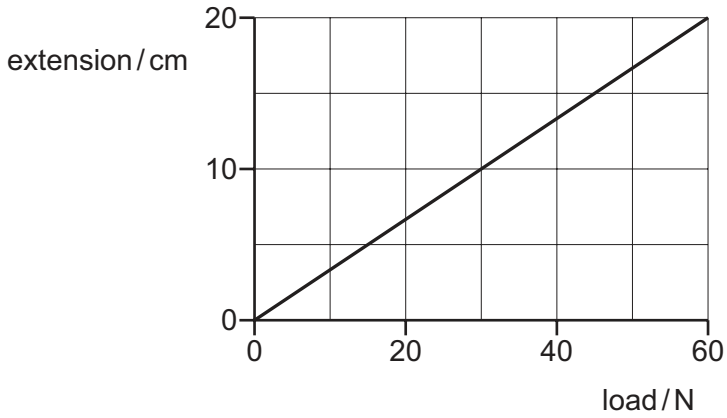
29 A mother is told 'Your baby weighs 3.0 kg'.

The gravitational field strength is 10 N / kg.

What are the mass and the weight of the baby?

	mass	weight
A	0.3 kg	3.0 N
B	3.0 N	0.3 kg
C	3.0 kg	30 N
D	30 N	3.0 kg

30 The extension–load graph is for a spring.



The original length of the spring was 10 cm.

Which load would give a spring length of 15 cm?

A 5 N **B** 15 N **C** 30 N **D** 45 N

31 A solar cell is connected to a battery.

The solar cell charges the battery.

The energy is transferred from which energy store in the Sun to which energy store in the battery?

A chemical to thermal

B nuclear to chemical

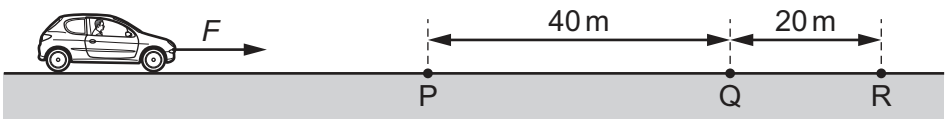
C nuclear to thermal

D thermal to electrostatic

32 A car travels along a straight, horizontal road.

From point P to point Q, the driving force *F* on the car is 2000 N.

From point Q to point R, the driving force *F* on the car is 1000 N.



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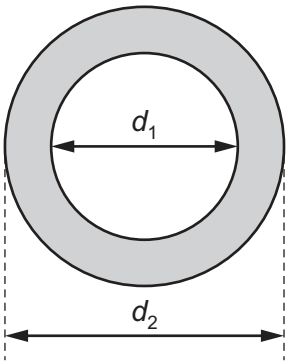
What is the total work done by the driving force in moving the car from point P to point R?

A 60 000 J **B** 100 000 J **C** 120 000 J **D** 180 000 J

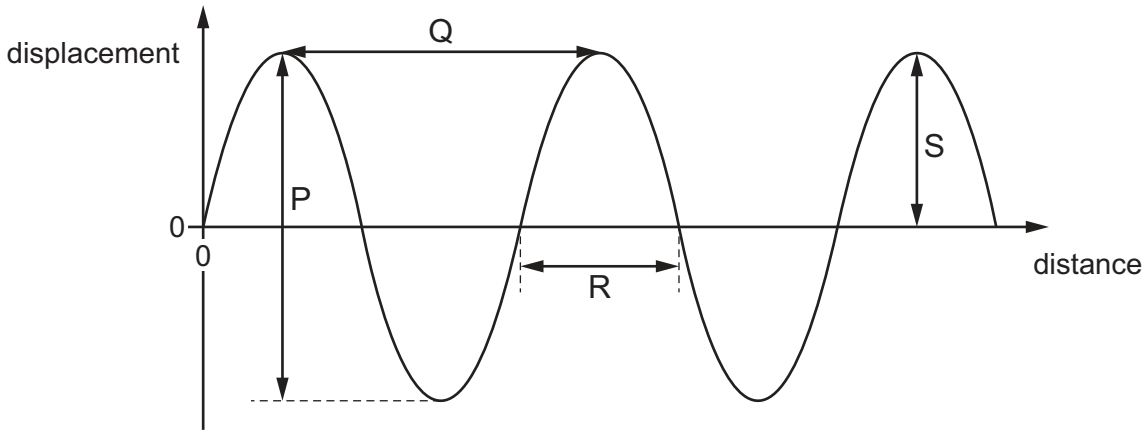
33 The diagram shows a ring made from brass.



What happens to the size of d_1 and d_2 when the ring is heated?

	d_1	d_2
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

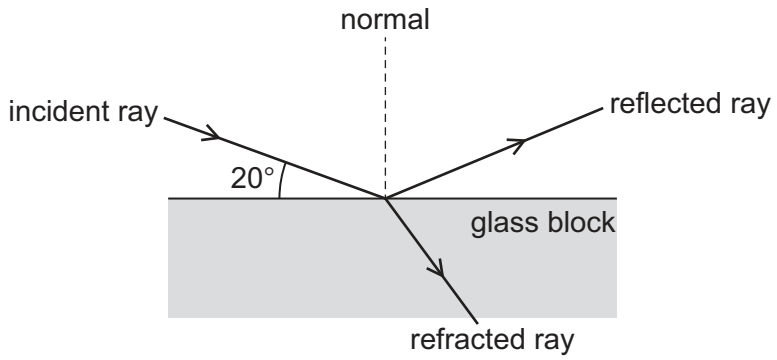
34 The diagram shows a cross-section through a wave.



What are the amplitude and the wavelength of the wave?

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

35 A ray of light is incident on a glass block at an angle of 20° to the surface of the block, as shown.



Some light is reflected and some light is refracted.

Which statement is possible?

A The angle of reflection is 20°.

B The angle of reflection is 80°.

C The angle of refraction is 39°.

D The angle of refraction is 75°.

36 Which statement about the particles in an atom is correct?

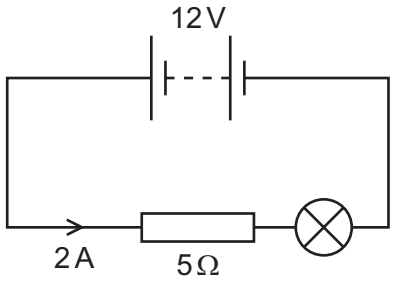
A Electrons repel other electrons.

B Neutrons repel other neutrons.

C Protons attract other protons.

D Protons neither attract nor repel other protons.

37 The diagram shows the value of various quantities in a circuit.



What is the potential difference across the resistor?

A 2 V **B** 5 V **C** 10 V **D** 12 V

38 In a household electrical circuit, why are fuses and switches always placed in the live wire?

A A break in the live wire stops the current in the circuit.

B A break in the neutral wire does **not** stop the current in the circuit.

C The live wire carries a greater current than the neutral wire.

D The neutral wire carries no current.

39 A nucleus of aluminium has a mass number of 27 and an atomic number of 13.

Which statement about this nucleus is correct?

A It has 13 neutrons.

B It has 27 neutrons.

C It has 13 particles.

D It has 27 particles.

40 What is a Geiger-Müller (GM) tube used to detect?

A changes in temperature

B infrared radiation

C magnetic fields

D radioactive emissions

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

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

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).