



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice

October/November 2016

45 minutes

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

* 3 4 9 6 7 2 6 2 0 8 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, glue or correction fluid.

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

DO NOT WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.

Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

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

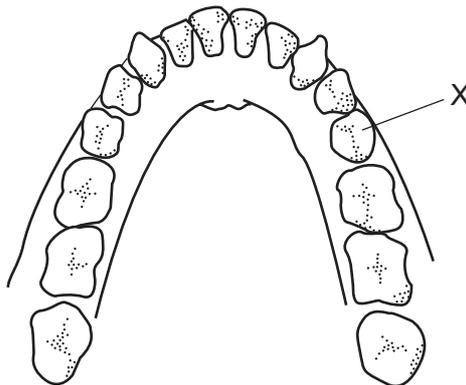
Electronic calculators may be used.

This document consists of **16** printed pages.

- 1 The plant *Mimosa pudica* grows in Central and South America. Its leaves close up rapidly when touched.

Which two characteristics are shown by this action?

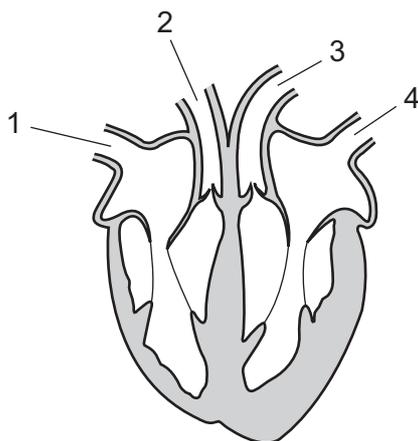
- A growth and movement
 - B growth and sensitivity
 - C movement and sensitivity
 - D respiration and growth
- 2 Which statement about enzymes is correct?
- A Amylase breaks down fats into fatty acids and glycerol.
 - B Amylase breaks down proteins into amino acids.
 - C Lipase breaks down fats into fatty acids and glycerol.
 - D Lipase breaks down proteins into amino acids.
- 3 The diagram shows human teeth in the lower jaw.



What type of tooth is X?

- A canine
- B incisor
- C molar
- D premolar

- 4 The diagram shows a section through the human heart.



Which two blood vessels are arteries?

- A** 1 and 2 **B** 2 and 3 **C** 3 and 4 **D** 4 and 1
- 5 A plant is growing in an open field. The table shows the weather conditions on four different days in the same week.

On which day does the plant lose water the fastest?

	day	rainfall/mm	average humidity/%	average temperature/°C	sunshine/hours
A	Monday	5	95	20	5
B	Tuesday	2	98	18	4
C	Wednesday	2	90	22	8
D	Thursday	0	75	25	7

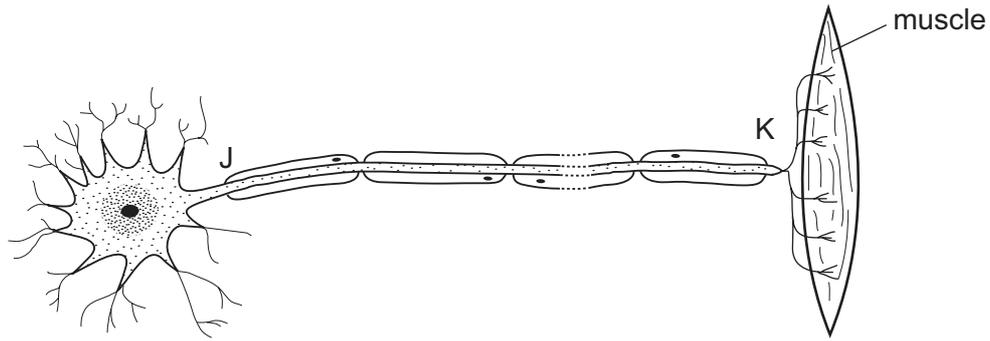
- 6 Which substance is absorbed from the alveoli?

- A** carbon dioxide
B oxygen
C nitrogen
D water vapour

- 7 Which statement about expired air is correct?

- A** It contains 16% oxygen.
B It contains 21% oxygen.
C It contains more carbon dioxide than nitrogen.
D It contains no oxygen.

8 The diagram shows a neurone and associated structures.



What type of neurone is shown and in which direction do impulses travel?

	type of neurone	direction of impulse
A	motor	J to K
B	motor	K to J
C	sensory	J to K
D	sensory	K to J

9 What are the effects of adrenaline?

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

10 Two plants, P and Q, each give rise to one offspring. The two offspring are genetically identical.

How were plants P and Q produced and how did they reproduce?

	how P and Q were produced	how P and Q reproduced
A	asexually	asexually
B	asexually	sexually
C	sexually	asexually
D	sexually	sexually

11 Which part of the male reproductive system transports both sperm and urine?

- A prostate gland
- B sperm duct
- C testis
- D urethra

12 The diagram shows a food chain.

Which organisms pass the greatest amount of energy along the food chain?



13 Which molecule contains carbon?

- A ammonia
- B fat
- C sulfuric acid
- D water

14 Which substances exist as covalent molecules?

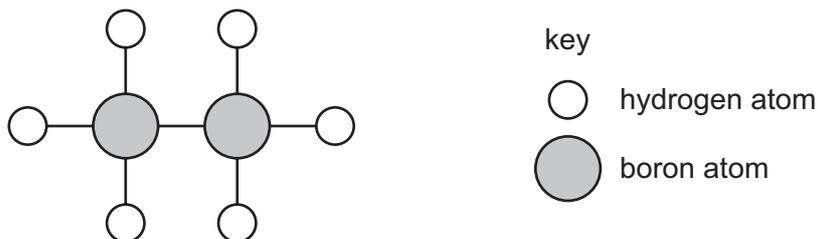
- 1 chlorine
- 2 helium
- 3 ethanol
- 4 sodium chloride

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

15 Which row describes the properties of a covalent compound?

	volatility	electrically conductive when molten
A	high	no
B	high	yes
C	low	no
D	low	yes

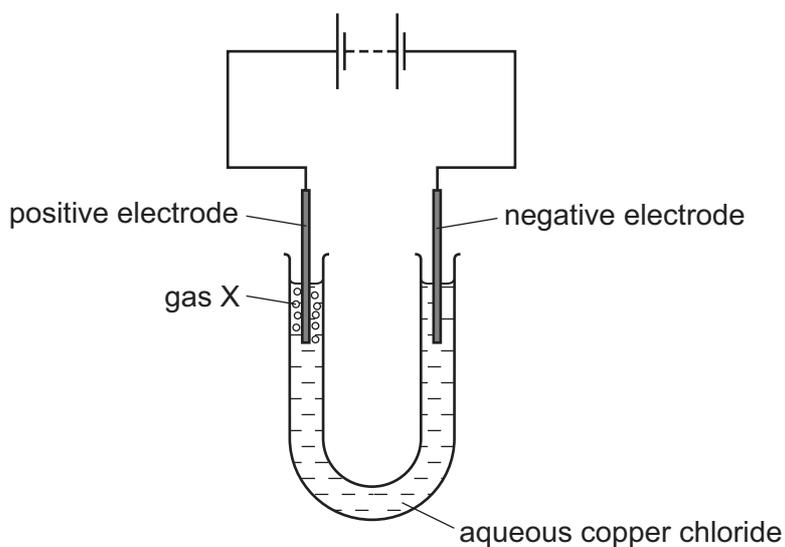
16 A model of a molecule is shown.



Which row shows the formula of this molecule and describes the type of bonding between the atoms?

	formula	bonding
A	2BH_3	covalent
B	2BH_3	ionic
C	B_2H_6	covalent
D	B_2H_6	ionic

17 Apparatus used to electrolyse aqueous copper chloride is shown.



The negative electrode is called the1..... . Gas X turns damp red litmus paper2..... .

Which words complete gaps 1 and 2?

	1	2
A	anode	blue
B	anode	white
C	cathode	blue
D	cathode	white

- 18 Which type of reaction and which temperature change take place when an acid reacts with an alkali?

	type of reaction	temperature change
A	endothermic	decrease
B	endothermic	increase
C	exothermic	decrease
D	exothermic	increase

- 19 Dilute hydrochloric acid reacts with solid calcium carbonate.

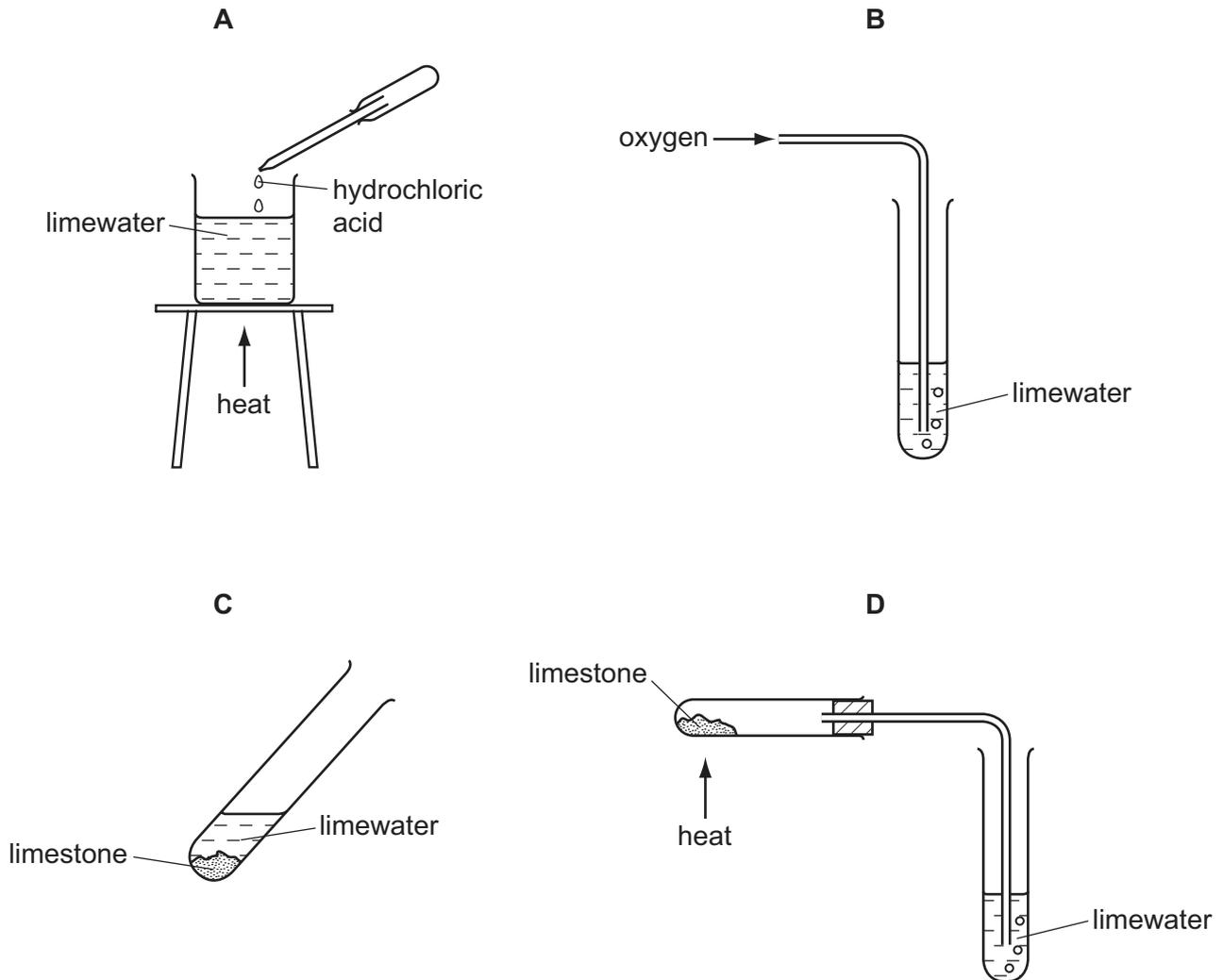
Which change decreases the speed of the reaction?

- A** Decrease the concentration of the hydrochloric acid.
- B** Decrease the size of the calcium carbonate particles.
- C** Increase the surface area of the calcium carbonate.
- D** Increase the temperature of the acid.

- 20 Which row describes metallic oxides and non-metallic oxides?

	metallic oxides	non-metallic oxides
A	acidic	acidic
B	acidic	basic
C	basic	acidic
D	basic	basic

21 In which experiment does limewater become milky?



22 Which statement about the Periodic Table is correct?

- A Elements are listed in order of neutron number.
- B Elements are listed in order of nucleon number.
- C Elements are listed in order of proton number.
- D Elements are listed in order of relative atomic mass.

23 Which statement about lithium, sodium and potassium is **not** correct?

- A They are in the same group of the Periodic Table.
- B They are in the same period of the Periodic Table.
- C They float on water.
- D They react with water to give a flammable gas.

24 Some properties of aluminium are listed.

- 1 It conducts heat.
- 2 It has a low density.
- 3 It has strong alloys.
- 4 It is resistant to corrosion.

Which properties make aluminium useful in aircraft manufacture?

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

25 Which conditions are required for rusting?

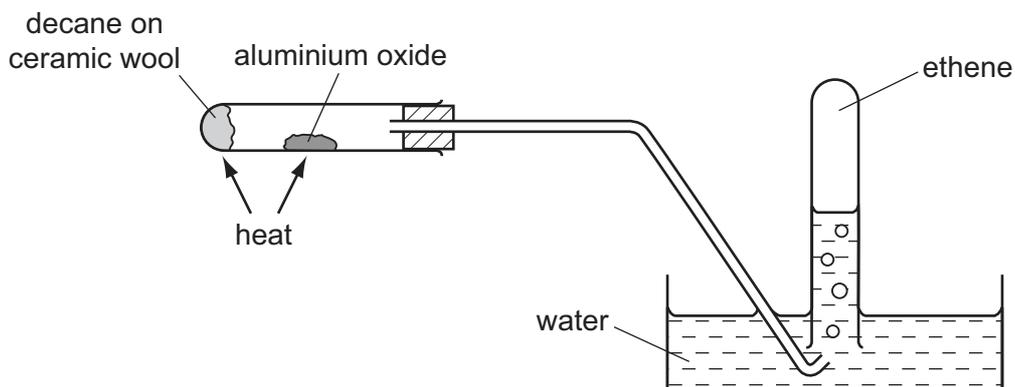
- A** air only
B air and water
C salt and water
D water only

26 Which process and type of reaction describes the formation of lime from limestone?

	process	type of reaction
A	addition of water	endothermic
B	thermal decomposition	endothermic
C	addition of water	exothermic
D	thermal decomposition	exothermic

27 Ethene is formed when decane, $C_{10}H_{22}$, is passed over hot aluminium oxide.

The aluminium oxide is unchanged in this process.



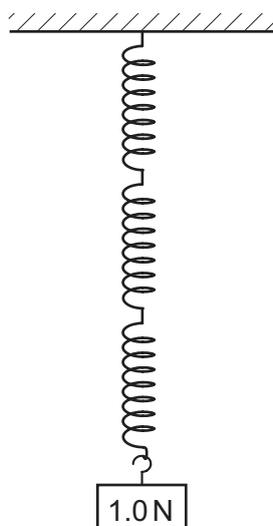
Which terms describe the type of reaction and the role of the aluminium oxide?

	type of reaction	role of aluminium oxide
A	cracking	catalyst
B	cracking	compound
C	fractional distillation	catalyst
D	fractional distillation	compound

28 A student tests three identical springs. Each spring stretches by 3.0 cm when a 3.0 N load is suspended from one end of it. The extension of each spring is directly proportional to the load applied.

The three springs are connected together as shown.

A 1.0 N load is placed on the end of the springs.



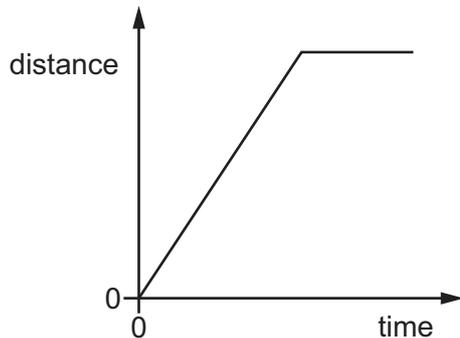
What is the total extension of all the springs together?

- A** 1.0 cm **B** 3.0 cm **C** 6.0 cm **D** 9.0 cm

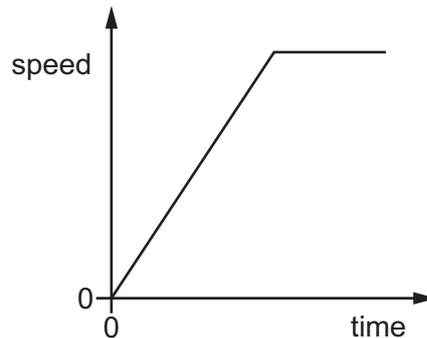
29 Which is a unit of power?

- A kilogram
- B joule
- C newton
- D watt

30 The diagram shows two graphs. Graph 1 is a distance/time graph. Graph 2 is a speed/time graph.



graph 1



graph 2

Which of the graphs represent a car that travels at a constant speed and then stops?

- A graph 1 and graph 2
 - B graph 1 only
 - C graph 2 only
 - D neither graph 1 nor graph 2
- 31 A liquid in an open container is evaporating, but not boiling.

Which molecules escape as the liquid evaporates, and from where do they escape?

- A Any of the molecules escape but only from the surface.
- B Any of the molecules escape and from any part of the liquid.
- C Only molecules with enough energy escape and only from the surface.
- D Only molecules with enough energy escape but from any part of the liquid.

32 Thermal energy is supplied to a gas at constant pressure.

What happens to the volume of the gas and what happens to the temperature of the gas?

	volume	temperature
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

33 How is thermal energy transferred in a vacuum?

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

34 A water wave passes point Y.

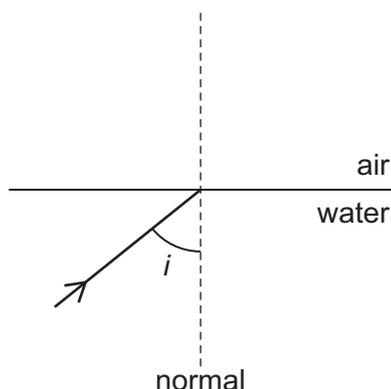
A student counts how many wave crests pass point Y in 30 seconds.

Using **only** this information, what can the student calculate?

- A** the amplitude of the wave
- B** the frequency of the wave
- C** the speed of the wave
- D** the wavelength of the wave

35 The diagram shows a ray of light travelling in water towards air above the water.

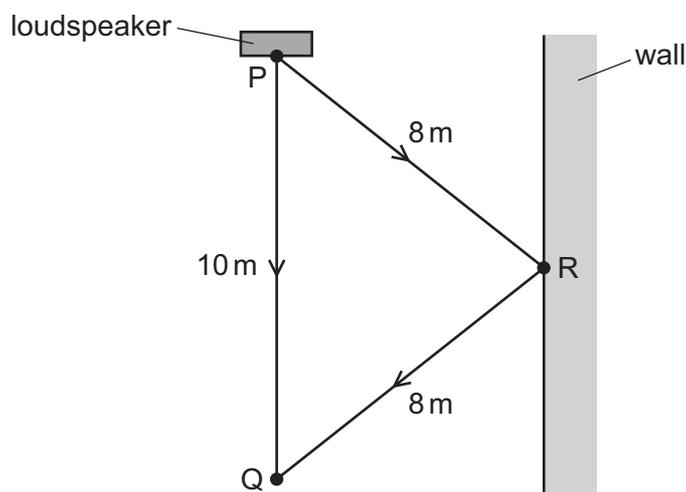
The angle of incidence i is slightly less than 49° .



The critical angle for water is 49° .

What is the angle of refraction of the ray?

- A slightly less than 49°
 - B slightly less than 90°
 - C slightly more than 49°
 - D slightly more than 90°
- 36 Sound from a loudspeaker at P travels directly to Q. Sound also reaches Q after being reflected from a wall at R.

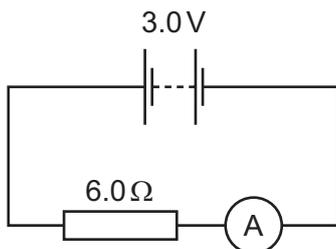


The speed of sound is 330 m/s .

What is the **difference** in time for sound to travel from P to Q by the two routes?

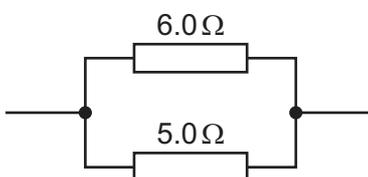
- A $\left(\frac{6}{330}\right) \text{ s}$
- B $\left(\frac{16}{330}\right) \text{ s}$
- C $(6 \times 330) \text{ s}$
- D $(16 \times 330) \text{ s}$

- 37 The diagram shows a 3.0V battery connected to a 6.0Ω resistor and an ammeter.



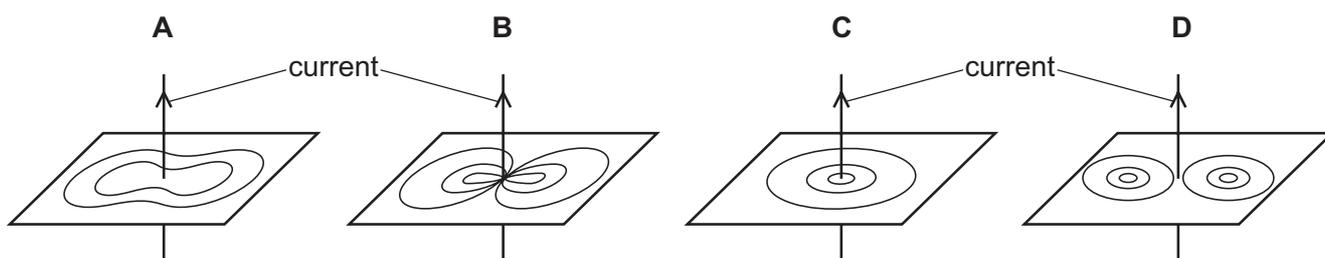
What is the reading on the ammeter?

- A 0.50A B 2.0A C 9.0A D 18A
- 38 The diagram shows a 6.0Ω and a 5.0Ω resistor connected in parallel.

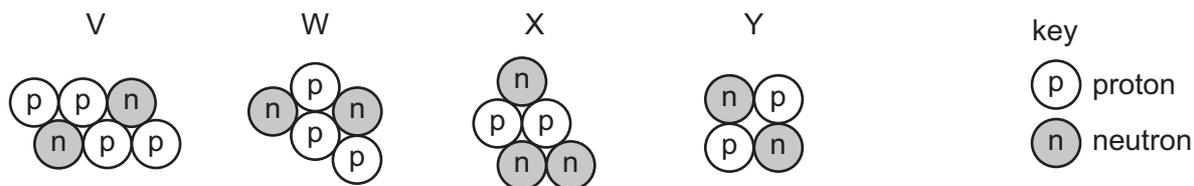


What is their combined resistance?

- A less than 5.0Ω
 B exactly 5.5Ω
 C between 5.6Ω and 6.0Ω
 D exactly 11Ω
- 39 Which diagram shows the magnetic field pattern around a straight wire carrying a current?



40 The diagrams represent the nuclei of four different atoms V, W, X and Y.



Which two diagrams represent isotopes of the same element?

- A** V and W **B** W and X **C** X and Y **D** Y and V

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The Periodic Table of Elements

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

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium —	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
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.)