



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**PHYSICAL SCIENCE**

**0652/11**

Paper 1 Multiple Choice

**October/November 2015**

**45 minutes**

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



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**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.

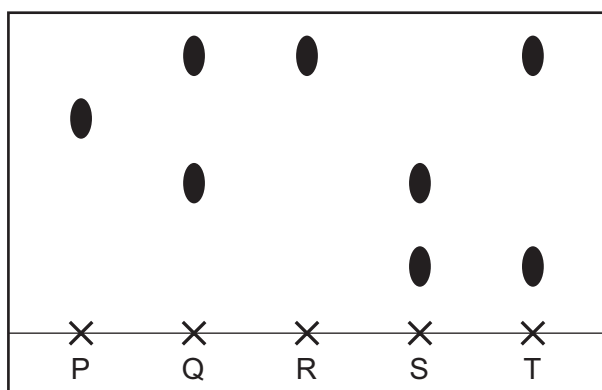
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This document consists of **17** printed pages and **3** blank pages.

1 Which row describes the particles in a solid?

	movement	attraction	distance
<b>A</b>	stationary	strong	close together
<b>B</b>	vibrating	strong	close together
<b>C</b>	vibrating	strong	far apart
<b>D</b>	vibrating	weak	close together

2 The diagram shows the chromatogram obtained using five felt-tip pens.



Which statement about the pens is **not** correct?

- A** One of the dyes is found in three pens.
  - B** Pen R contains a mixture of dyes.
  - C** Three pens contain two dyes.
  - D** Two pens contain only one dye.
- 3 An isotope of sodium is represented as  ${}_{11}^{23}\text{Na}$ .

Which row represents a different isotope of sodium?

	electrons	neutrons	protons
<b>A</b>	11	13	11
<b>B</b>	12	12	12
<b>C</b>	13	12	13
<b>D</b>	23	12	23

- 4 The following statements are about covalent bonding.

Covalent bonds are formed by the .....1..... of electrons.

Covalent substances have .....2..... electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
<b>A</b>	sharing	high
<b>B</b>	sharing	low
<b>C</b>	transfer	high
<b>D</b>	transfer	low

- 5 Ethyl ethanoate has the formula  $\text{CH}_3\text{CO}_2\text{C}_2\text{H}_5$ .

What is the relative molecular mass  $M_r$  of this compound?

- A** 48                      **B** 72                      **C** 88                      **D** 124

- 6 Boron, B, forms an oxide.

Which equation is balanced?

- A**  $2\text{B} + 3\text{O}_2 \rightarrow \text{B}_2\text{O}_3$   
**B**  $2\text{B} + 3\text{O}_2 \rightarrow 2\text{B}_2\text{O}_3$   
**C**  $4\text{B} + 2\text{O}_2 \rightarrow 2\text{B}_2\text{O}_3$   
**D**  $4\text{B} + 3\text{O}_2 \rightarrow 2\text{B}_2\text{O}_3$

- 7 Anhydrous copper(II) sulfate is placed in a test-tube.

When water is added, the temperature changes from  $17^\circ\text{C}$  to  $27^\circ\text{C}$ .

Which type of reaction takes place?

- A** addition  
**B** endothermic  
**C** exothermic  
**D** oxidation

8 In biological washing powders, the breakdown of organic molecules is speeded up by which type of substance?

- A enzymes
- B oxidising agents
- C reducing agents
- D transition metals

9 Sulfuric acid is reacted with magnesium.

Which row identifies the products of this reaction?

	products		
	magnesium sulfate	water	hydrogen
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	x
<b>C</b>	✓	x	✓
<b>D</b>	x	✓	✓

10 A colourless solution of X is tested with aqueous sodium hydroxide and with acidified silver nitrate.

test	observation
aqueous sodium hydroxide added	white precipitate formed
acidified silver nitrate added	white precipitate formed

What is X?

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

11 Which statement about period 2 in the Periodic Table is correct?

- A They are all metals.
- B They are all non-metals.
- C They change from metal to non-metal from left to right.
- D They change from non-metal to metal from left to right.

12 Which metal produces a solution of a metal hydroxide when added to water?

- A calcium
- B copper
- C iron
- D zinc

13 Brass is an alloy.

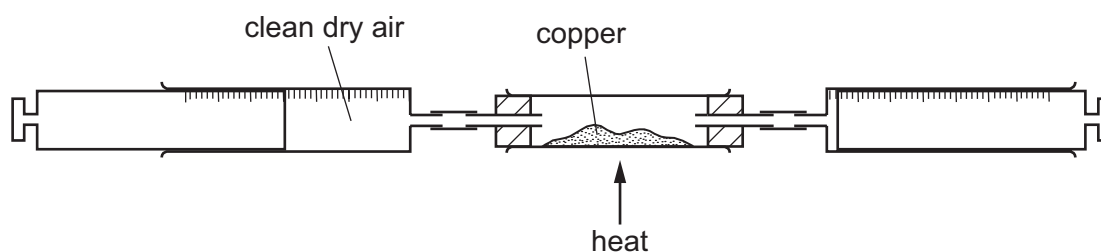
Which element is added to copper to make brass?

- A carbon
- B iron
- C nickel
- D zinc

14 Which substance can be used as a chemical test for water?

- A anhydrous copper sulfate
- B hydrated cobalt chloride
- C hydrated copper sulfate
- D pink cobalt chloride

15 A sample of clean, dry air is passed repeatedly over hot copper until all the oxygen reacts with the copper as shown.



The volume of air decreases by  $15 \text{ cm}^3$ .

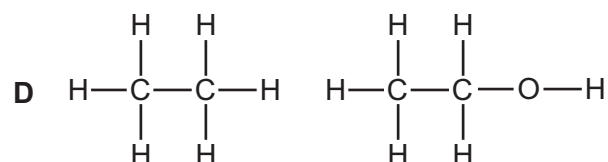
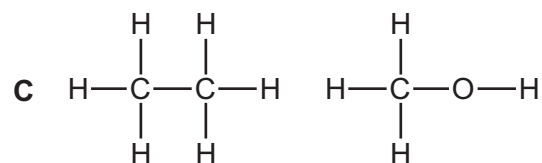
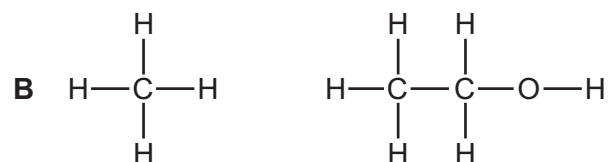
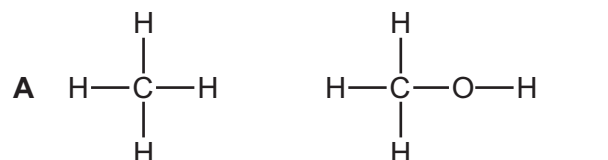
What is the starting volume of the sample of air?

- A  $30 \text{ cm}^3$
- B  $50 \text{ cm}^3$
- C  $75 \text{ cm}^3$
- D  $100 \text{ cm}^3$

16 Which reaction takes place when calcium oxide is formed from calcium carbonate?

- A addition
- B combustion
- C oxidation
- D thermal decomposition

17 Which two structures show methane and ethanol?

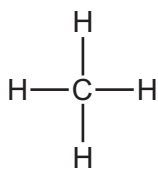


18 One member of the alkane homologous series is butane which is used as a fuel.

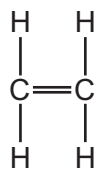
What are the products of combustion when butane is burned in excess air?

- A carbon and water
- B carbon dioxide and hydrogen
- C carbon dioxide and water
- D carbon monoxide and water

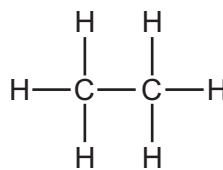
19 The diagram shows the structures of three hydrocarbons.



1



2



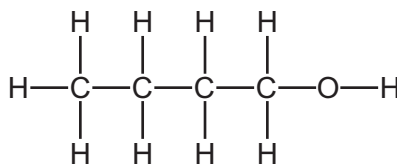
3

Hydrogen, oxygen and steam react with some hydrocarbons.

Which of the hydrocarbons above react with **all three** substances?

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

20 The structure of an organic compound X is shown.

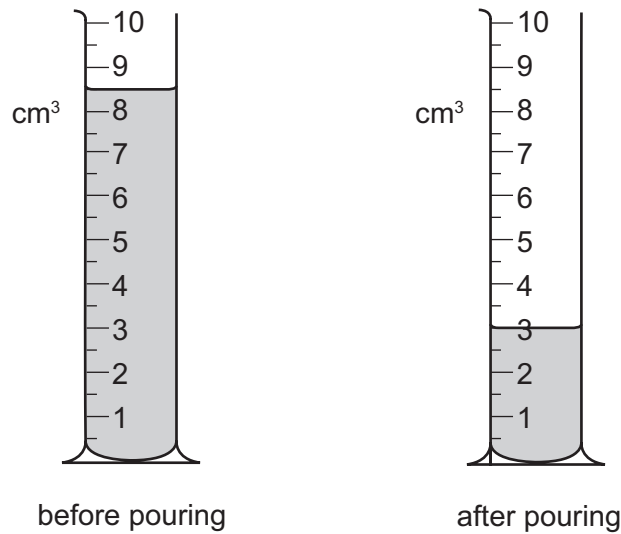


To which group does X belong?

- A** alcohols  
**B** alkanes  
**C** alkenes  
**D** carboxylic acids

21 Some water is poured from a measuring cylinder.

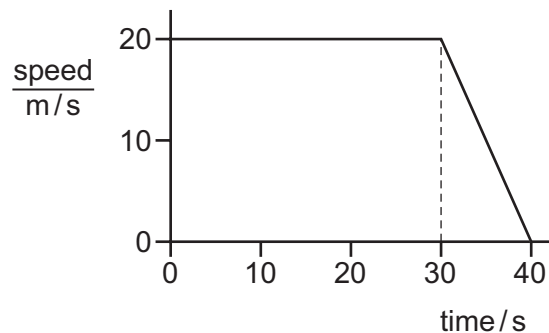
The diagrams show the measuring cylinder before and after the water is poured from it.



What volume of water is poured from the measuring cylinder?

- A** 3.0 cm<sup>3</sup>      **B** 5.5 cm<sup>3</sup>      **C** 6.5 cm<sup>3</sup>      **D** 8.5 cm<sup>3</sup>

22 The speed/time graph shows the motion of a car during 40 seconds.



What is the total distance travelled by the car in this time?

- A** 400 m      **B** 700 m      **C** 800 m      **D** 1000 m

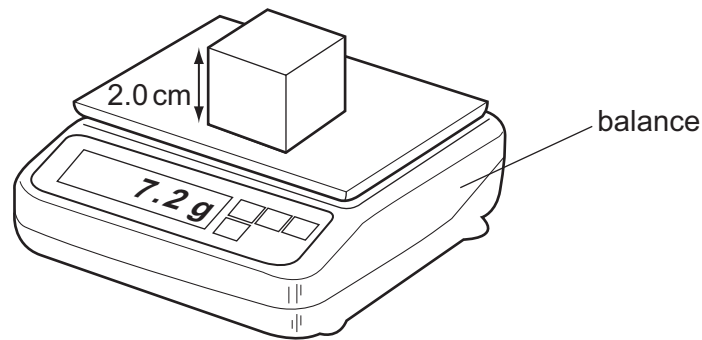
23 A bag of rice has a mass of 450g. The gravitational field strength  $g$  is 10 N/kg.

What is the weight of the bag of rice?

- A** 4500 N      **B** 450 N      **C** 45 N      **D** 4.5 N

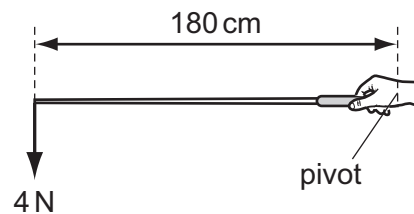
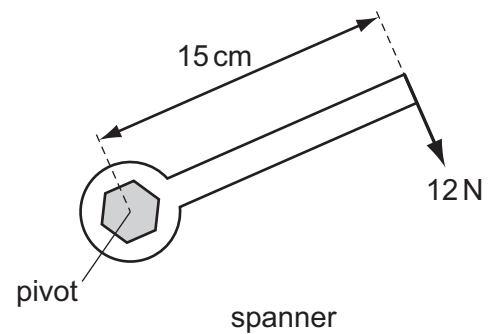
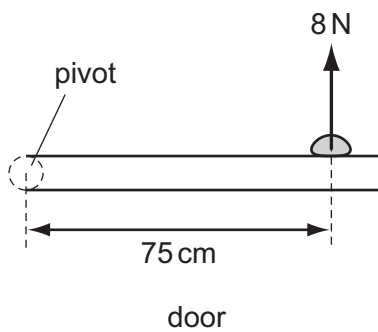


- 24 A cube of side 2.0 cm is placed on a balance. The mass of the cube is shown on the balance.



What is the density of the cube?

- A 0.90 g/cm<sup>3</sup>    B 1.2 g/cm<sup>3</sup>    C 1.8 g/cm<sup>3</sup>    D 3.6 g/cm<sup>3</sup>
- 25 Each diagram shows an example of a force causing a moment about a pivot. The diagrams are not drawn to the same scale.



Which row gives the moments produced by the forces, in order, from smallest moment to largest moment?

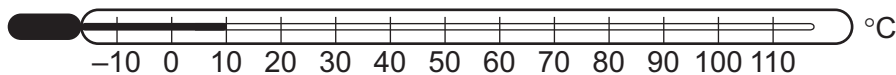
	smallest moment	→	largest moment
<b>A</b>	door	fishing rod	spanner
<b>B</b>	fishing rod	door	spanner
<b>C</b>	spanner	door	fishing rod
<b>D</b>	spanner	fishing rod	door

- 26 A student lifts a box from the floor to a shelf. The size of the force used to lift the box affects the total amount of work done by the student.

On which other quantity does the work done depend?

- A the height of the shelf above the floor
- B the surface area of the box
- C the time taken to lift the box
- D the volume of the box

- 27 A liquid-in-glass thermometer is marked with a scale in  $^{\circ}\text{C}$ .



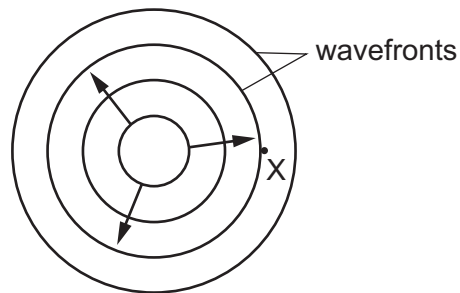
What are the fixed points for this thermometer?

- A  $-10^{\circ}\text{C}$  and  $10^{\circ}\text{C}$
  - B  $-10^{\circ}\text{C}$  and  $110^{\circ}\text{C}$
  - C  $0^{\circ}\text{C}$  and  $100^{\circ}\text{C}$
  - D  $10^{\circ}\text{C}$  and  $110^{\circ}\text{C}$
- 28 A vacuum flask has double glass walls. There is a vacuum between the glass walls.

How is heat transferred through the vacuum?

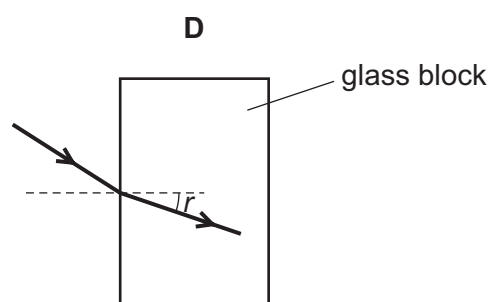
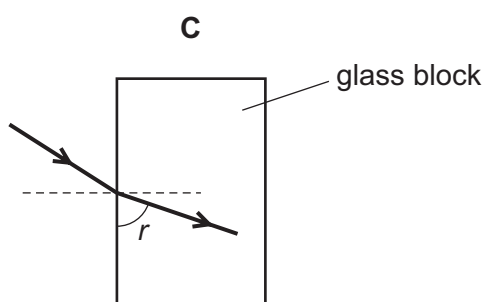
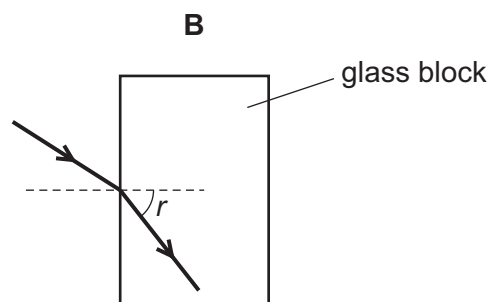
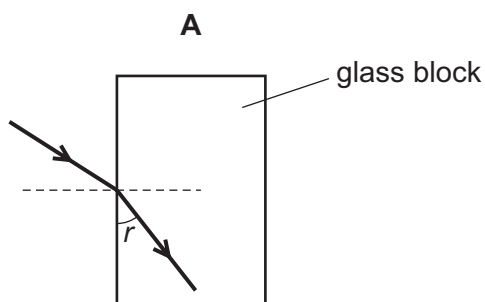
- A by conduction only
- B by convection only
- C by radiation only
- D by conduction and radiation

- 29 A stone is thrown into a pool and a wave spreads out from where the stone hits the water.



What name is given to the number of wavefronts passing point X per second?

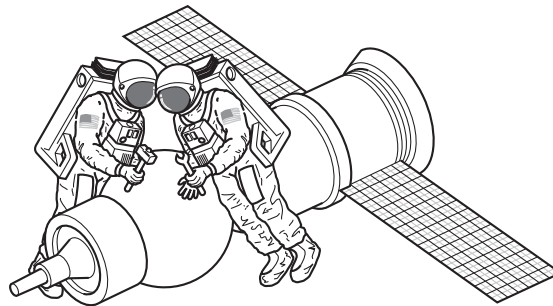
- A amplitude
  - B frequency
  - C wavelength
  - D wave speed
- 30 Which diagram shows a ray of light passing from air into a glass block and correctly labels the angle of refraction  $r$ ?



31 Which row in the table contains electromagnetic waves in order of increasing wavelength?

	smallest wavelength	—————→			largest wavelength
<b>A</b>	ultra violet	X-rays	microwaves	radio	
<b>B</b>	visible light	infra-red	radio	gamma-rays	
<b>C</b>	visible light	ultra violet	X-rays	gamma-rays	
<b>D</b>	X-rays	ultra violet	visible light	microwaves	

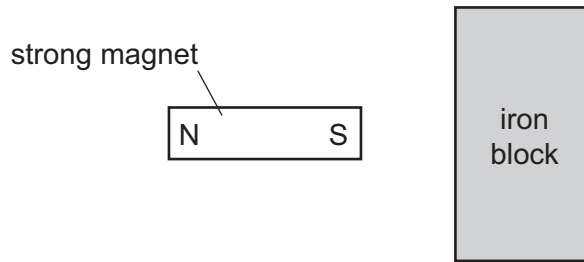
32 Two astronauts without radios can only communicate in space if their helmets are touching. There is no air in space.



What does this show about sound?

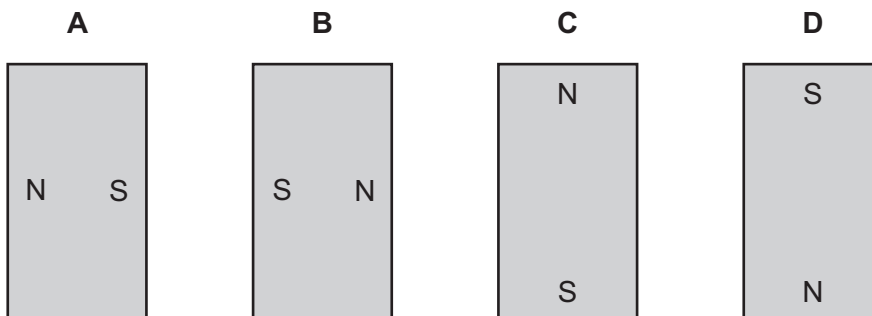
- A** It can travel through a solid and a vacuum.
- B** It can travel through a solid but cannot travel through a vacuum.
- C** It cannot travel through a solid but it can travel through a vacuum.
- D** It cannot travel through either a solid or a vacuum.

- 33 A strong permanent magnet is placed close to an iron block, as shown in the diagram.



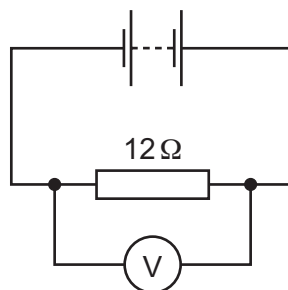
Magnetic poles are induced in the iron block.

What is the arrangement of the induced poles?



- 34 The diagram shows a battery connected to a  $12\ \Omega$  resistor and a voltmeter.

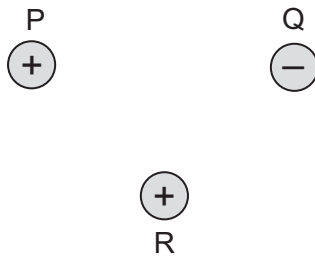
The reading on the voltmeter is  $24\ \text{V}$ .



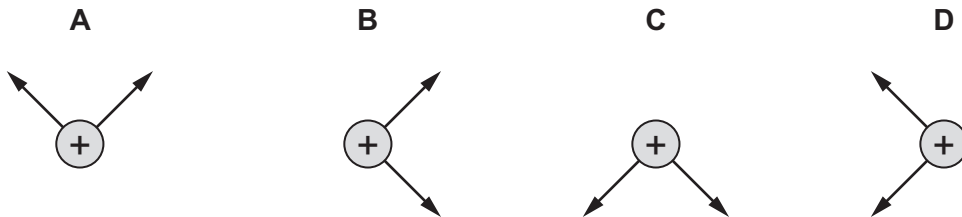
Which row shows the current in the circuit and the e.m.f. of the battery?

	current in circuit / A	e.m.f. of battery / V
<b>A</b>	0.5	2.0
<b>B</b>	0.5	24
<b>C</b>	2.0	2.0
<b>D</b>	2.0	24

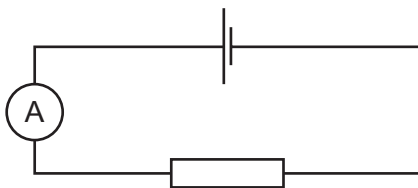
35 The diagram shows the charges on three bodies P, Q and R.



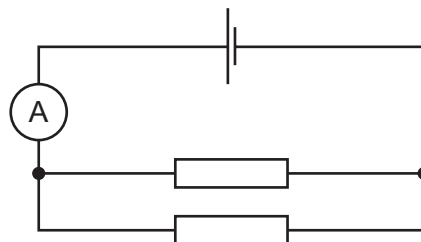
Which diagram shows the direction of the forces that act on body R?



36 The diagrams show two electric circuits. Circuit 1 contains a cell, an ammeter and a resistor. A second resistor is now connected to circuit 1, to make circuit 2.



circuit 1

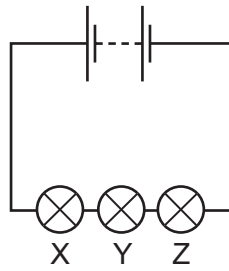


circuit 2

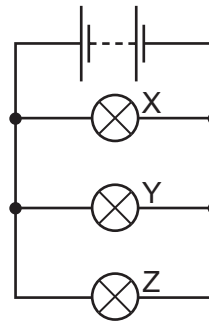
Which circuit has the smaller total resistance and in which circuit is the ammeter reading smaller?

	smaller total resistance	smaller reading on ammeter
<b>A</b>	circuit 1	circuit 1
<b>B</b>	circuit 1	circuit 2
<b>C</b>	circuit 2	circuit 1
<b>D</b>	circuit 2	circuit 2

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



circuit 1



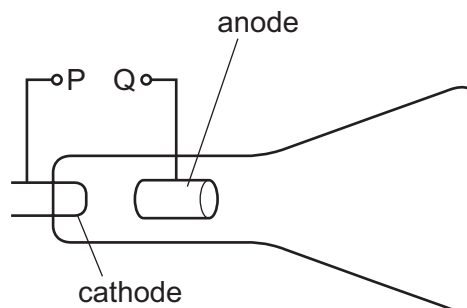
circuit 2

Which statement is correct?

- A If lamp Y breaks in circuit 1, both the other lamps go off.
- B If lamp Y breaks in circuit 2, both the other lamps go off.
- C If lamp Y breaks in circuit 1, lamp Z goes off, but lamp X remains on.
- D If lamp Y breaks in circuit 2, lamp Z goes off, but lamp X remains on.

38 The diagram shows part of a cathode-ray tube, as found in an oscilloscope.

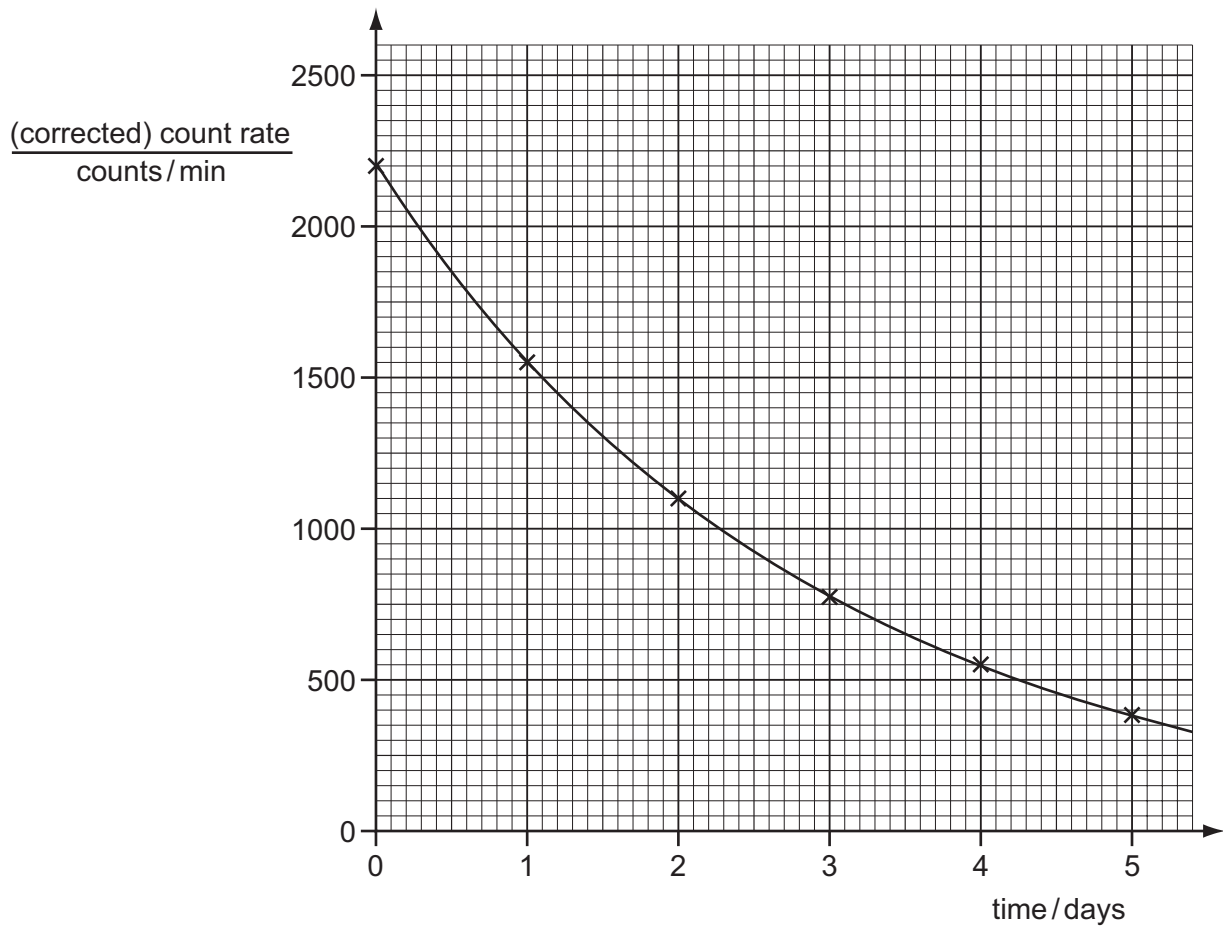
Electrical connections P and Q are labelled.



Which row shows the sign of the voltage at P, the sign of the voltage at Q and the component that is heated?

	voltage at P	voltage at Q	heated component
<b>A</b>	+	-	anode
<b>B</b>	+	-	cathode
<b>C</b>	-	+	anode
<b>D</b>	-	+	cathode

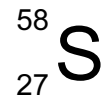
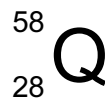
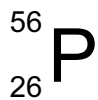
39 The graph shows the decay curve for one particular radioactive isotope.



What is the half-life of this isotope?

- A** 1.0 day      **B** 1.5 days      **C** 2.0 days      **D** 2.5 days

40 Four different nuclides are represented by the symbols shown.



Which pair of symbols represents different isotopes of the same element?

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





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**DATA SHEET**  
**The Periodic Table of the Elements**

		Group											
I	II	III	IV	V	VI	VII	0						
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10					
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18						
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	101 <b>Ru</b> Ruthenium 44	101 <b>Tc</b> Technetium 43	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	186 <b>Os</b> Osmium 76	186 <b>Re</b> Rhenium 75	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92

\*58-71 Lanthanoid series  
†90-103 Actinoid series

	a	<b>X</b>	a = relative atomic mass
Key	b	<b>X</b>	X = atomic symbol
			b = proton (atomic) number

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