



Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice (Core)

October/November 2019

45 minutes

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



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

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

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

DO NOT WRITE IN ANY BARCODES.

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

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

Read the instructions on the Answer Sheet very carefully.

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

Any rough working should be done in this booklet.

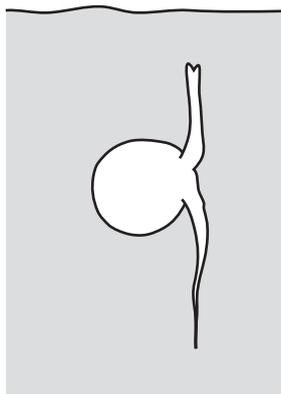
A copy of the Periodic Table is printed on page 20.

Electronic calculators may be used.

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

2

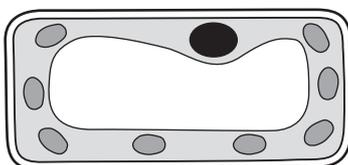
- 1 The diagram shows a germinating seed in the soil.



Which characteristics of living organisms is the seed demonstrating?

| | characteristic | |
|----------|----------------|-------------|
| | growth | sensitivity |
| A | ✓ | ✓ |
| B | ✓ | x |
| C | x | ✓ |
| D | x | x |

- 2 The diagram shows a section through a cell.

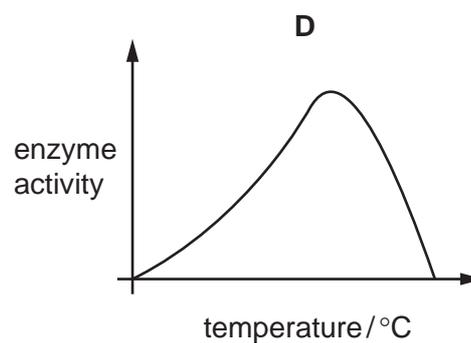
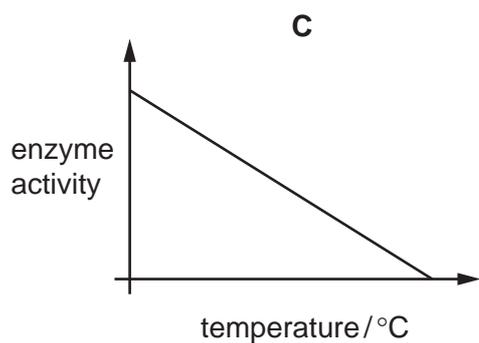
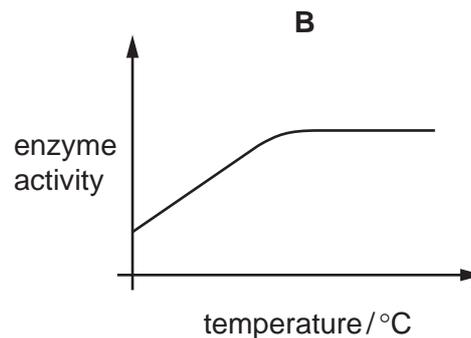
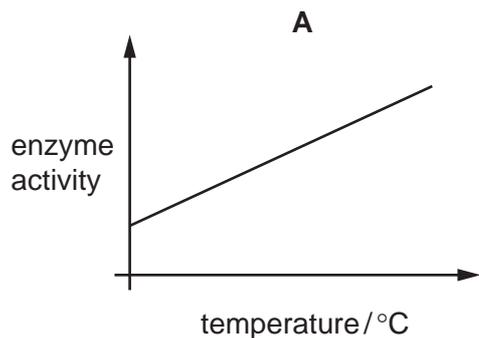


What shows that this is a plant cell?

- A** It has a cell membrane.
B It has a nucleus.
C It has a permanent vacuole.
D It has cytoplasm.
- 3 Which result with the biuret test shows that protein is present?
- A** blue
B green
C orange
D purple

3

4 Which graph shows how enzyme activity is affected by temperature?



5 What is the word equation for photosynthesis?

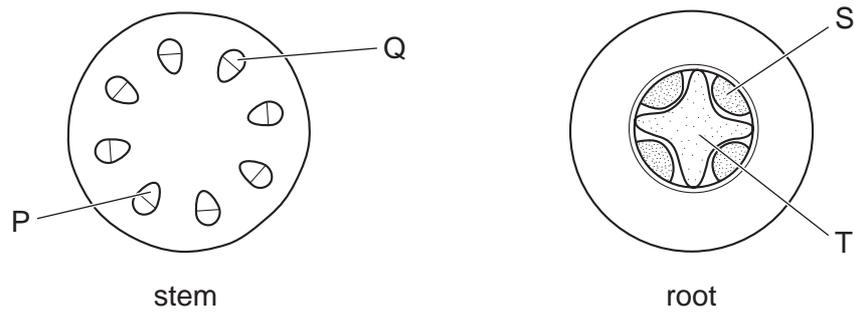
- A** carbon dioxide + glucose → oxygen + water
- B** carbon dioxide + water → oxygen + glucose
- C** oxygen + glucose → carbon dioxide + water
- D** oxygen + water → carbon dioxide + glucose

6 Where is bile stored?

- A** gall bladder
- B** liver
- C** pancreas
- D** stomach

4

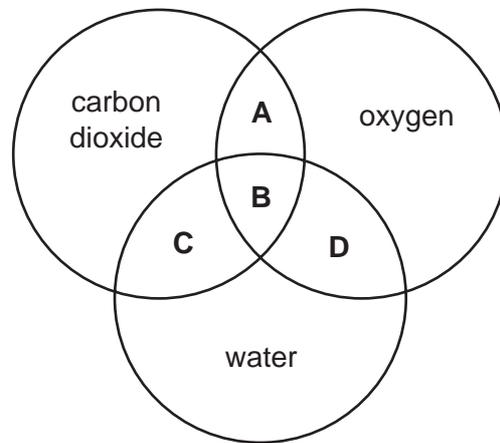
7 The diagrams show sections through a stem and a root.



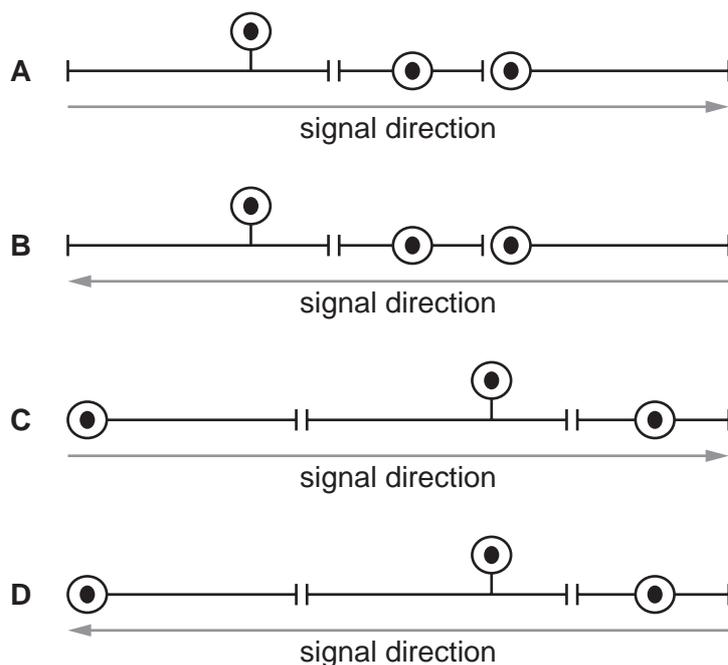
Which indicate the positions of the xylem?

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

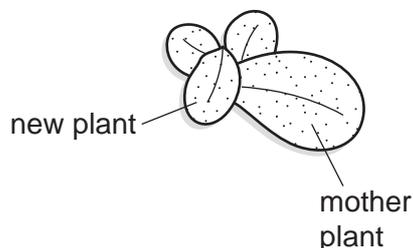
8 Which area represents the substances produced in aerobic respiration?



- 9 Which diagram shows the sequence of neurones in a reflex arc, and the direction of travel of the electrical signal?



- 10 Duckweed can reproduce by producing new plants from an original 'mother plant' as shown. These plants can then separate off and produce more plants themselves.



What does this demonstrate about how duckweed reproduces?

- A** asexual reproduction which produces genetically different plants
B asexual reproduction which produces genetically identical plants
C sexual reproduction which produces genetically different plants
D sexual reproduction which produces genetically identical plants
- 11 A pure-breeding mouse with black fur was bred with a pure-breeding mouse with white fur. All the offspring had black fur.

What are the genotypes of the two parent mice?

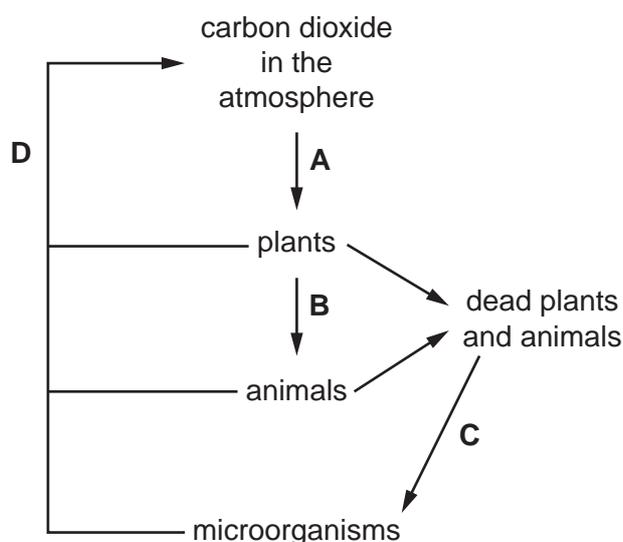
- A** $Bb \times bb$ **B** $Bb \times Bb$ **C** $BB \times bb$ **D** $BB \times BB$

12 What is the principal source of energy input into a biological system?

- A consumer
- B decomposer
- C producer
- D Sun

13 The diagram shows some of the processes in the carbon cycle.

Which process is respiration?



14 Which processes are chemical changes?

- 1 conversion of steam to liquid water
- 2 cracking of alkanes
- 3 fractional distillation of petroleum
- 4 thermal decomposition of calcium carbonate

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

15 Which row compares the nucleus and the electronic structure of two isotopes of the same element?

| | nucleus | electronic structure |
|----------|-----------|----------------------|
| A | different | different |
| B | different | same |
| C | same | different |
| D | same | same |

16 Hydrogen peroxide is a compound.

A molecule of hydrogen peroxide can be represented as shown.



key

● = oxygen

○ = hydrogen

What is the formula of hydrogen peroxide?

A HO

B H₂O₂

C (OH)₂

D 2OH

17 The table shows the temperature of some water before and after a solid is dissolved in it.

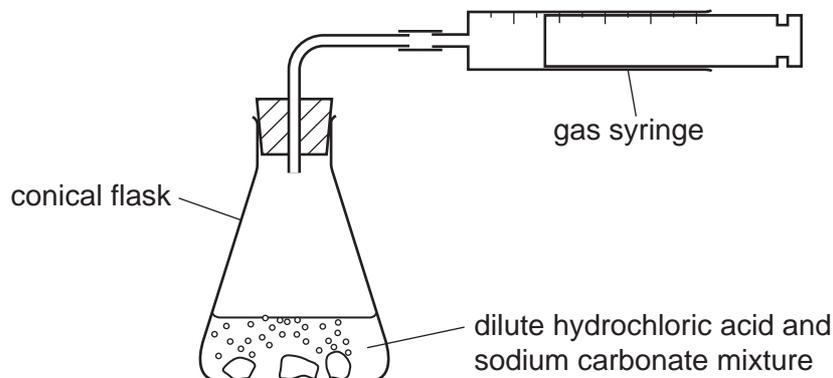
Which change is the most exothermic?

| | temperature before /°C | temperature after /°C |
|---|---------------------------|--------------------------|
| A | 20 | 18 |
| B | 20 | 40 |
| C | 25 | 18 |
| D | 25 | 42 |

- 18** When 50 cm^3 of dilute hydrochloric acid and excess solid sodium carbonate are mixed, they react to form carbon dioxide gas.

The gas is collected in a gas syringe.

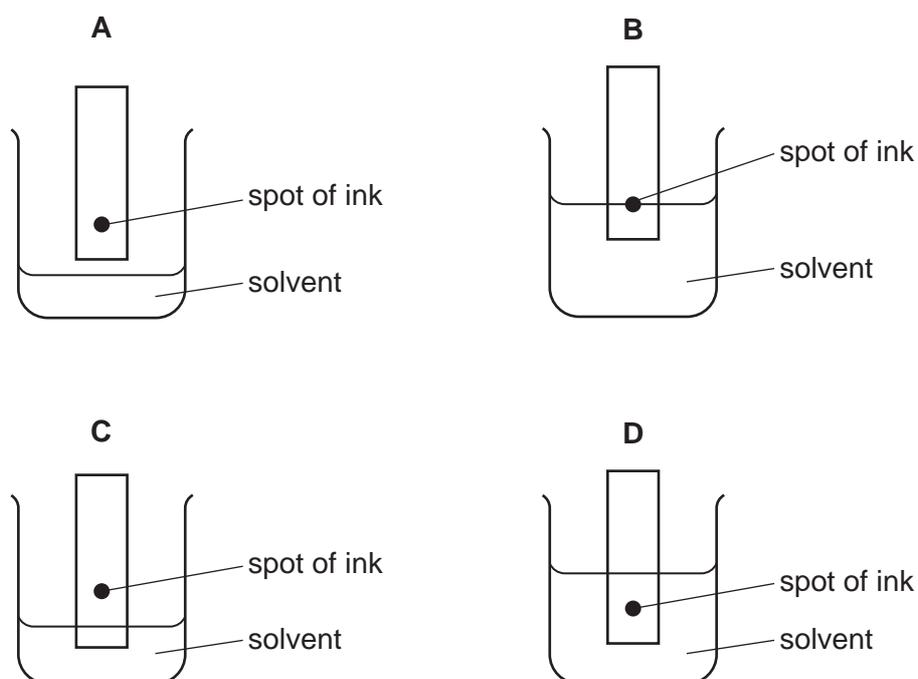
The experiment is repeated using 25 cm^3 of dilute hydrochloric acid.



Which statement about the second experiment compared to the first experiment is correct?

- A** It has the same initial rate of reaction and produces a lower volume of gas.
 - B** It has the same initial rate of reaction and produces the same volume of gas.
 - C** It has a slower initial rate of reaction and produces a lower volume of gas.
 - D** It has a slower initial rate of reaction and produces the same volume of gas.
- 19** The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?



20 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.

21 The halogens are elements in Group VII of the Periodic Table.

They are1..... non-metals.

They become2..... in colour down the group.

Which words complete gaps 1 and 2?

| | 1 | 2 |
|---|-----------|---------|
| A | diatomic | darker |
| B | diatomic | lighter |
| C | monatomic | darker |
| D | monatomic | lighter |

22 Which statement describes **all** metals?

- A They break when hit with a hammer.
- B They conduct electricity.
- C They dissolve in water.
- D They have high densities.

23 When substance X is added to blue cobalt(II) chloride paper, the paper turns pink.

What is X?

- A ammonia
- B an acid
- C chlorine gas
- D water

24 Which processes produce carbon dioxide?

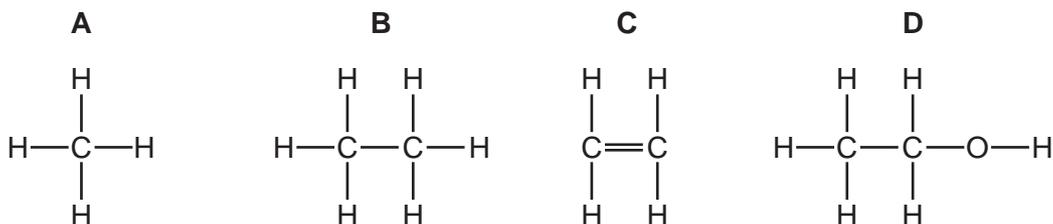
- 1 acid reacting with a metal
- 2 respiration
- 3 combustion of ethanol
- 4 acid reacting with a metal oxide

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

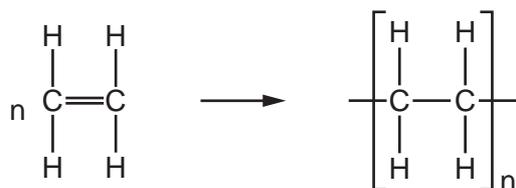
25 Which row describes lime and the solubility of limestone in water?

| | lime | limestone |
|----------|--------------|-----------|
| A | acidic oxide | insoluble |
| B | acidic oxide | soluble |
| C | basic oxide | insoluble |
| D | basic oxide | soluble |

26 Which structure represents ethanol?



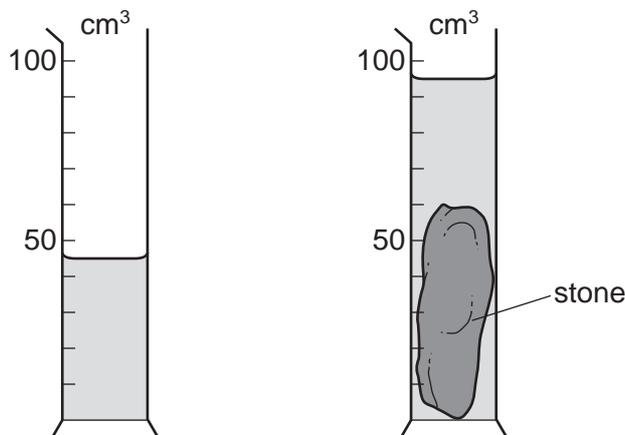
27 Which type of reaction is represented by the equation?



- A** addition polymerisation
- B** cracking
- C** fermentation
- D** reduction

28 A stone is lowered into a measuring cylinder containing water.

The diagrams show the readings on the measuring cylinder with and without the stone.



What is the volume of the stone?

- A** 40 cm³ **B** 50 cm³ **C** 60 cm³ **D** 95 cm³

29 There is no resultant force acting on a body.

Which statement is correct?

- A** The body is either at rest or moving at constant speed in a straight line.
B The body must be at rest.
C The body is gaining speed.
D The body is losing speed.

30 Four cars are driven the same distance along a straight, horizontal road.

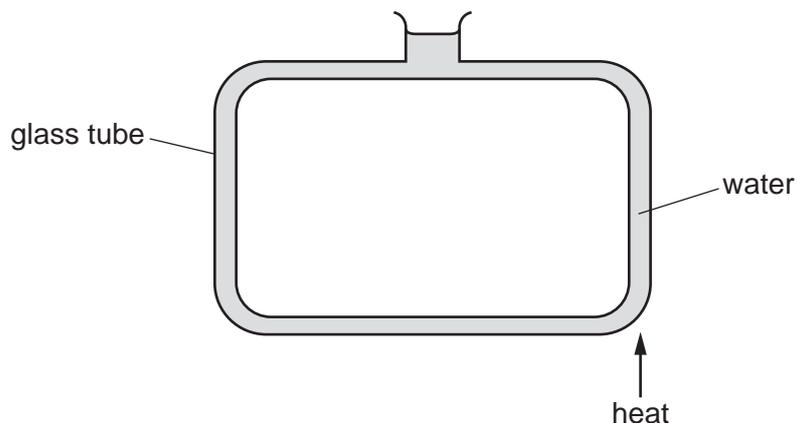
The table shows the work done by the engine in each car and the time taken by each car.

Which engine produces the most power?

| | work done by engine / J | time taken / s |
|----------|-------------------------|----------------|
| A | 50 000 | 20 |
| B | 50 000 | 40 |
| C | 100 000 | 20 |
| D | 100 000 | 40 |

31 The diagram shows a shaped glass tube filled with water.

When the water is heated at the point shown, the water begins to move round the tube.



What is the main method of heat transfer that is occurring within the water and in which direction does the water move?

| | method of heat transfer | direction of movement |
|----------|-------------------------|-----------------------|
| A | conduction | anticlockwise |
| B | conduction | clockwise |
| C | convection | anticlockwise |
| D | convection | clockwise |

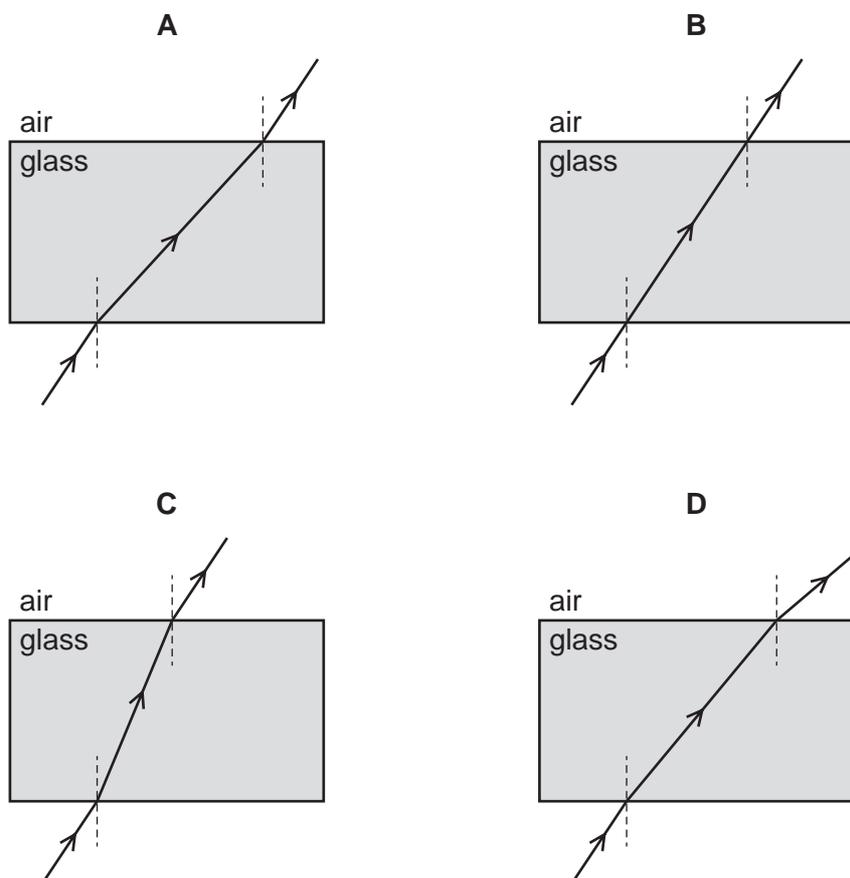
32 A substance is a gas when its temperature is 65°C .

How do the boiling point and the melting point of this substance compare with 65°C ?

| | boiling point | melting point |
|----------|----------------------------|----------------------------|
| A | above 65°C | above 65°C |
| B | above 65°C | below 65°C |
| C | below 65°C | above 65°C |
| D | below 65°C | below 65°C |

33 Light passes through a glass block that has parallel sides.

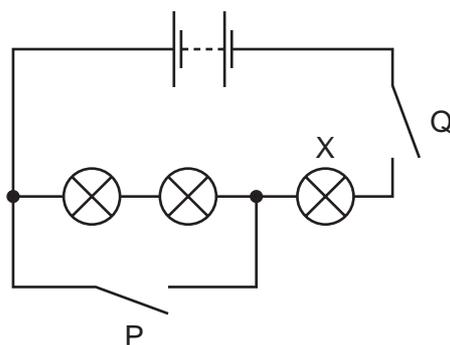
Which diagram shows the path of the light?



34 Which electromagnetic waves are used by television remote controllers?

- A gamma
- B infra-red
- C microwaves
- D X-rays

- 35 The diagram shows a circuit containing two switches P and Q, and three lamps. One lamp is labelled X.

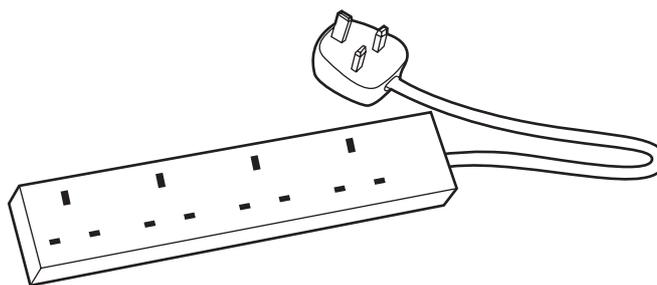


Which of the switches must be closed so that **only** lamp X is lit?

- A neither switch
 - B switch P only
 - C switch Q only
 - D switch P and switch Q
- 36 Which row shows how lamps are connected in a lighting circuit in a house and gives an advantage of connecting them in this way?

| | how lamps are connected | advantage of connecting them in this way |
|----------|-------------------------|--|
| A | in parallel | they can be switched separately |
| B | in parallel | they share the voltage |
| C | in series | they can be switched separately |
| D | in series | they share the voltage |

- 37 An electrical extension block has four sockets, a cable which can safely take a current of 6 A and a plug. It is protected by a fuse rated at 5 A.



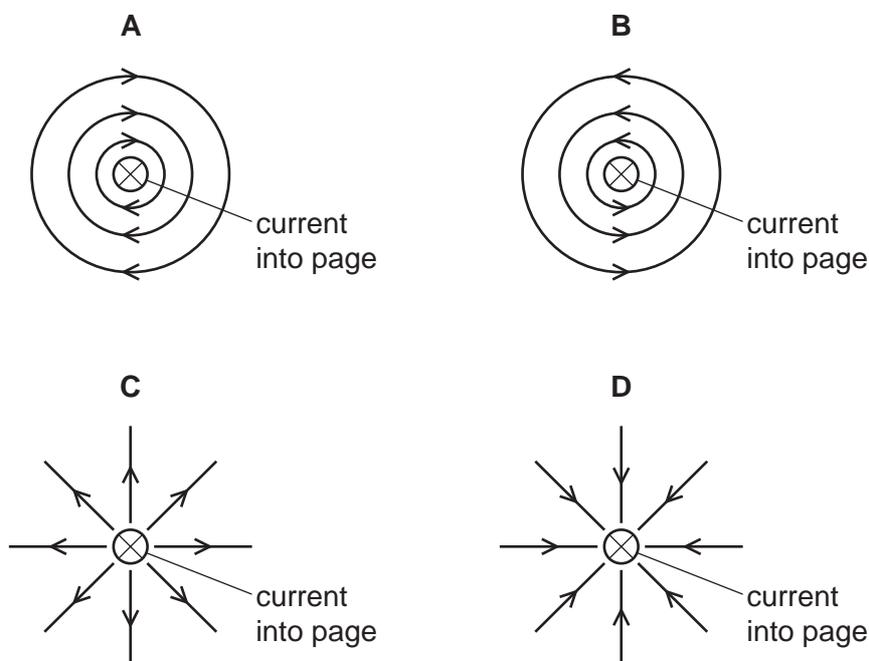
The extension block is used with four appliances and the 5 A fuse blows. The owner replaces the 5 A fuse with a 13 A fuse.

Why is the extension block now dangerous?

- A The appliances may overheat before the fuse blows.
 - B The cable may overheat before the fuse blows.
 - C The sockets may burn out before the fuse blows.
 - D The 13 A fuse may blow too soon.
- 38 There is a current-carrying wire perpendicular to the page.

The direction of the current is into the page.

Which diagram shows the pattern and direction of the magnetic field around the wire?



39 What is the proton number (atomic number) of the nuclide $^{14}_6\text{C}$?

A 6

B 8

C 14

D 20

40 Which type of radiation has the greatest ionising effect, and which is the most penetrating?

| | greatest ionising effect | most penetrating |
|---|--------------------------|---------------------|
| A | α -particles | α -particles |
| B | α -particles | γ -rays |
| C | γ -rays | α -particles |
| D | γ -rays | γ -rays |

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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 | 1 H hydrogen 1 | 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 | Key atomic number atomic symbol name relative atomic mass | | 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 — | 114 Fl flerovium — | 116 Lv livermorium — | 118 Og oganesson — | 119 Uue unbinilium — | 120 Uub unbinilium — | 121 Uut ununilium — | 122 Uuq ununilium — | 123 Uup ununilium — |

lanthanoids

actinoids

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

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