



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/11

Paper 1 Multiple Choice (Core)

May/June 2017

45 minutes

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

* 1 5 0 0 2 8 6 3 9 0 *

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.

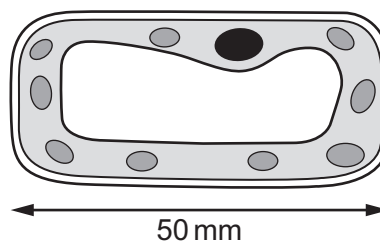
This document consists of **17** printed pages and **3** blank pages.

- 1 Process Q happens in cells.

carbohydrates → process Q → energy released

What is process Q?

- A growth
 - B nutrition
 - C respiration
 - D sensitivity
- 2 The diagram shows an image of a plant cell that has been magnified.



The actual length of the cell is 0.02 mm.

How many times has the cell been magnified?

- A × 10
 - B × 100
 - C × 250
 - D × 2500
- 3 Which statements about enzymes are correct?
- 1 Enzymes are proteins.
 - 2 Some enzymes carry out chemical digestion.
 - 3 Enzymes speed up the rate of chemical reactions.
 - 4 All enzymes work fastest at pH 7.
- A 1, 2 and 3
 - B 1 and 2 only
 - C 1 and 3 only
 - D 2, 3 and 4

- 4 The table shows the results when four foods are tested with Benedict's solution and biuret reagent.

Which food contains protein but **not** reducing sugar?

| | colour obtained with Benedict's solution | colour obtained with biuret reagent |
|----------|--|-------------------------------------|
| A | blue | green |
| B | blue | violet |
| C | red | green |
| D | red | violet |

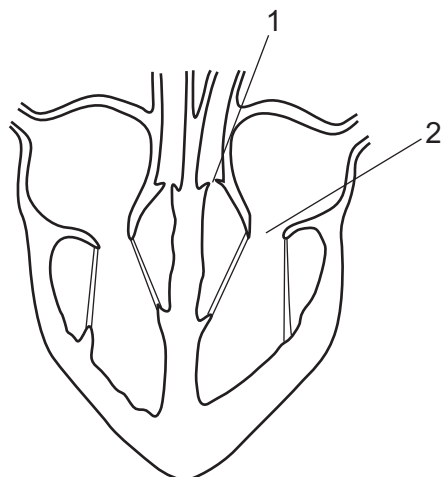
- 5 What are the products of photosynthesis?

- A** carbohydrates + oxygen
- B** carbohydrates + water
- C** carbon dioxide + oxygen
- D** carbon dioxide + water

- 6 During transpiration, from which part of a leaf does evaporation of water occur?

- A** cuticle
- B** mesophyll cells
- C** stomata
- D** xylem

7 The diagram shows a section through the heart.

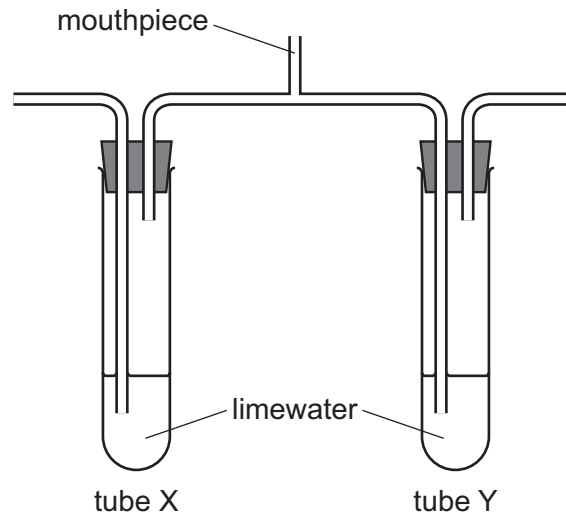


The ventricles contract and blood is forced into the arteries.

What is the state of valves 1 and 2 when this happens?

| | valve 1 | valve 2 |
|----------|---------|---------|
| A | closed | closed |
| B | closed | open |
| C | open | closed |
| D | open | open |

- 8 The diagram shows apparatus at the start of a breathing experiment.



A person breathes in and out through the mouthpiece for a short time.

Which row shows the results?

| | limewater in tube X | limewater in tube Y |
|----------|---------------------|---------------------|
| A | stays clear | stays clear |
| B | stays clear | turns cloudy |
| C | turns cloudy | stays clear |
| D | turns cloudy | turns cloudy |

- 9 Which statement about hormones in humans is correct?

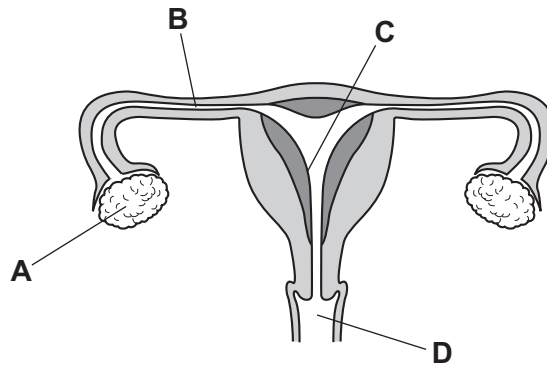
- A** They are destroyed by the liver.
- B** They are destroyed by the pancreas.
- C** They are produced by target organs.
- D** They are produced by the blood.

- 10 Which part of a plant protects the flower when it is a bud?

- A** petal
- B** sepal
- C** stem
- D** stigma

11 The diagram shows the female reproductive system.

Where does implantation of the embryo normally occur?



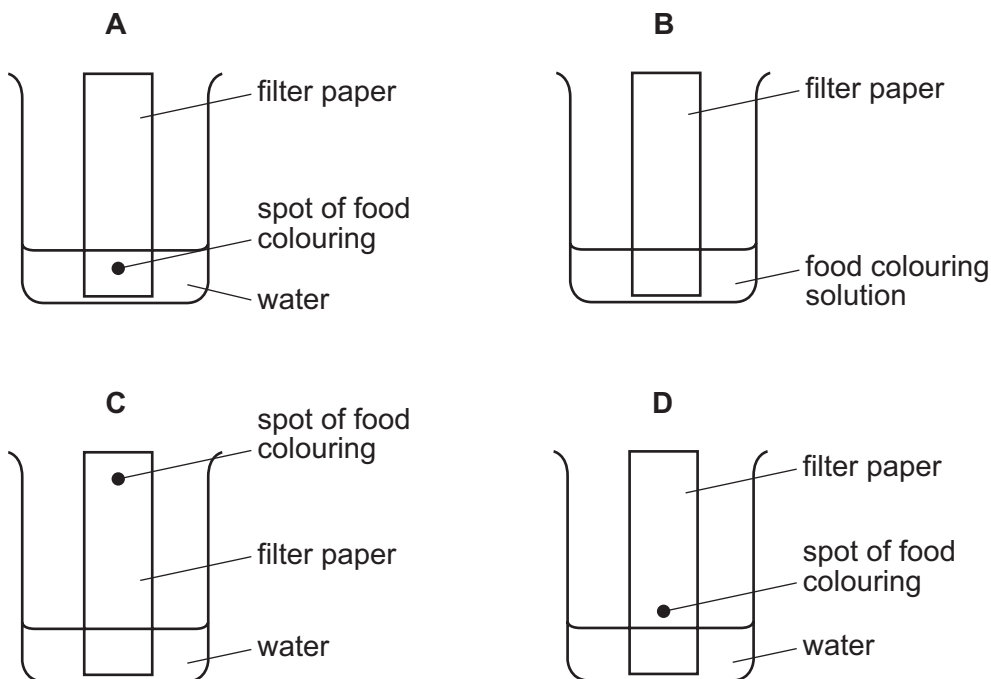
12 Which type of organism makes its own organic nutrients?

- A carnivore
- B consumer
- C herbivore
- D producer

13 What is **not** an effect of deforestation?

- A extinction of plant species
- B flooding of river valleys
- C increase of oxygen in the air
- D loss of soil by erosion

14 Which diagram shows how a mixture of dyes in a food colouring are separated?



15 Which process produces a chemical change?

- A adding ethanol to water
- B adding sodium to water
- C boiling water
- D melting ice

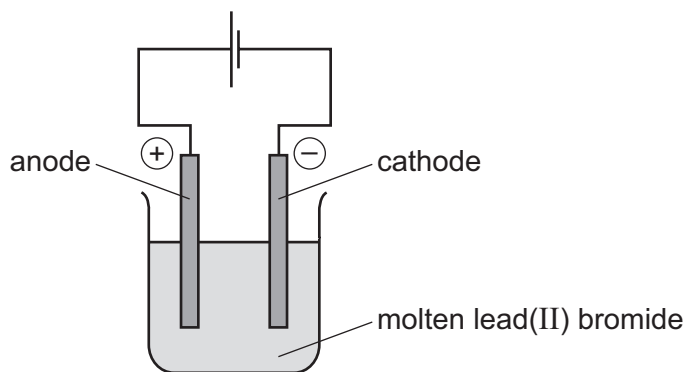
16 Sodium and potassium are Group I metals.

Chlorine and bromine are Group VII non-metals.

Which statement describes the formation of a covalent bond?

- A Potassium and bromine combine by sharing a pair of electrons.
- B Sodium and chlorine combine by electron loss and gain.
- C Two bromine atoms combine by electron loss and gain.
- D Two chlorine atoms combine by sharing a pair of electrons.

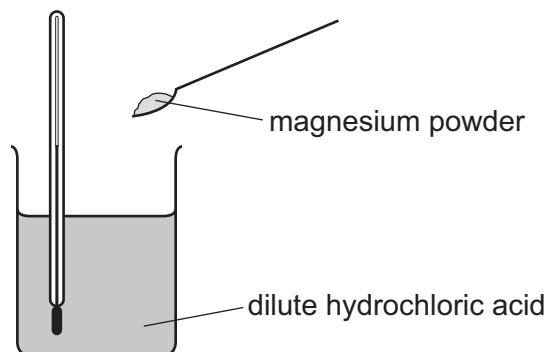
17 The diagram shows the electrolysis of molten lead(II) bromide.



What is produced at the electrodes?

| | anode | cathode |
|----------|----------------|----------------|
| A | brown gas | colourless gas |
| B | brown gas | grey liquid |
| C | colourless gas | brown gas |
| D | grey liquid | brown gas |

18 The diagram shows how the temperature change is measured when magnesium powder reacts with dilute hydrochloric acid.



Thermometer reading before adding magnesium powder = 20.6 °C

Thermometer reading after adding magnesium powder = 32.4 °C

Which statement is correct?

- A** The reaction is endothermic and gives out heat.
- B** The reaction is endothermic and takes in heat.
- C** The reaction is exothermic and gives out heat.
- D** The reaction is exothermic and takes in heat.

19 Hydrogen peroxide decomposes to form water and oxygen.

Which changes in temperature and in concentration **both** reduce the rate of this reaction?

| | temperature of hydrogen peroxide | concentration of hydrogen peroxide |
|----------|----------------------------------|------------------------------------|
| A | decrease | decrease |
| B | decrease | increase |
| C | increase | decrease |
| D | increase | increase |

20 In which word equation is copper reduced?

- A** anhydrous copper sulfate + water → hydrated copper sulfate
- B** copper carbonate + hydrochloric acid → copper chloride + water + carbon dioxide
- C** copper oxide + hydrogen → copper + water
- D** copper + oxygen → copper oxide

21 Magnesium hydroxide is an insoluble solid.

Magnesium sulfate is a soluble solid which is formed when magnesium hydroxide reacts with sulfuric acid.

Which method is used to make **pure** magnesium sulfate?

- A** React excess dilute sulfuric acid with magnesium hydroxide, filter and crystallise.
- B** React excess dilute sulfuric acid with magnesium hydroxide then evaporate until dry.
- C** React excess magnesium hydroxide with dilute sulfuric acid, filter and crystallise.
- D** React excess magnesium hydroxide with dilute sulfuric acid then evaporate until dry.

22 Acidified barium nitrate solution is added to solution X. A white precipitate forms.

What is X?

- A** hydrochloric acid
- B** limewater
- C** potassium chloride
- D** sulfuric acid

23 The diagram shows part of the Periodic Table.

The letters U to Z are **not** the symbols of the elements.

| I | II | | | | | | | | | | | III | IV | V | VI | VII | VIII |
|---|----|--|--|--|--|--|---|--|--|--|--|-----|----|---|----|-----|------|
| | | | | | | | | | | | | | | | | | |
| U | | | | | | | | | | | | | | | | Y | Z |
| | | | | | | | | | | | | | | X | | | |
| | V | | | | | | W | | | | | | | | | | |

Which elements are metals?

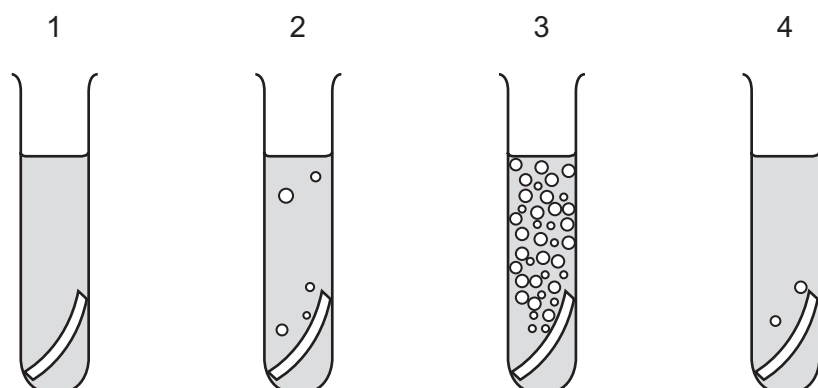
- A** U, V and W **B** U and V only **C** W and X **D** X, Y and Z

24 What is an alloy?

- A** a compound containing two metallic elements
B a compound containing two non-metallic elements
C a mixture containing two metallic elements
D a mixture containing two non-metallic elements

25 Equal sized pieces of four different metals are added to separate samples of dilute hydrochloric acid.

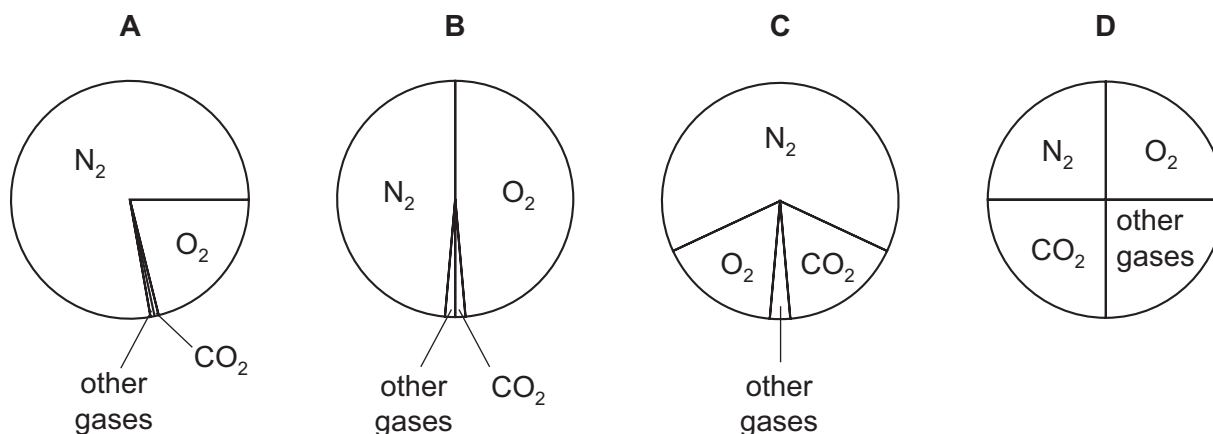
The results are shown.



Which row identifies the metals in the tubes?

| | tube 1 | tube 2 | tube 3 | tube 4 |
|----------|---------|-----------|-----------|-----------|
| A | calcium | copper | sodium | iron |
| B | copper | iron | potassium | sodium |
| C | copper | magnesium | calcium | zinc |
| D | iron | zinc | copper | magnesium |

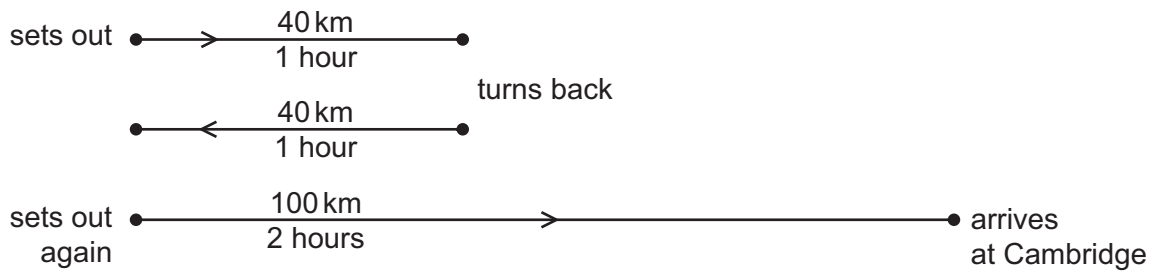
26 Which pie chart shows the proportions of gases in clean air?



27 Which property of the compounds in petroleum is used to separate it into useful fractions?

- A** boiling point
- B** density
- C** melting point
- D** solubility

- 28** A car driver sets out from home to travel to Cambridge. After 1 hour he is 40 km from home. He discovers that he must return home to collect his briefcase. This journey also takes him 1 hour. He sets off again immediately. He reaches Cambridge, 100 km from home, 2 hours later.



What is the average speed for the whole of his journey from leaving home the first time?

- A** 25 km/h **B** 45 km/h **C** 50 km/h **D** 90 km/h
- 29** Which row shows the unit for force, the unit for mass and the unit for weight?

| | force | mass | weight |
|----------|-------|------|--------|
| A | kg | kg | N |
| B | kg | N | kg |
| C | N | kg | N |
| D | N | N | kg |

- 30** A heavy ball is dropped from the top of a tower.
- Which form of energy decreases as the ball falls?
- A** gravitational
B kinetic
C thermal
D sound

- 31** Which force does the greatest amount of work?
- A** a force of 10 N moving an object a distance of 3.0 m
B a force of 10 N moving an object a distance of 5.0 m
C a force of 15 N moving an object a distance of 3.0 m
D a force of 15 N moving an object a distance of 5.0 m

32 A liquid changes into a gas and this causes the temperature of the liquid to change.

What is the name of this process, and how does the temperature change?

| | name of process | temperature change |
|----------|-----------------|--------------------|
| A | condensation | decreases |
| B | condensation | increases |
| C | evaporation | decreases |
| D | evaporation | increases |

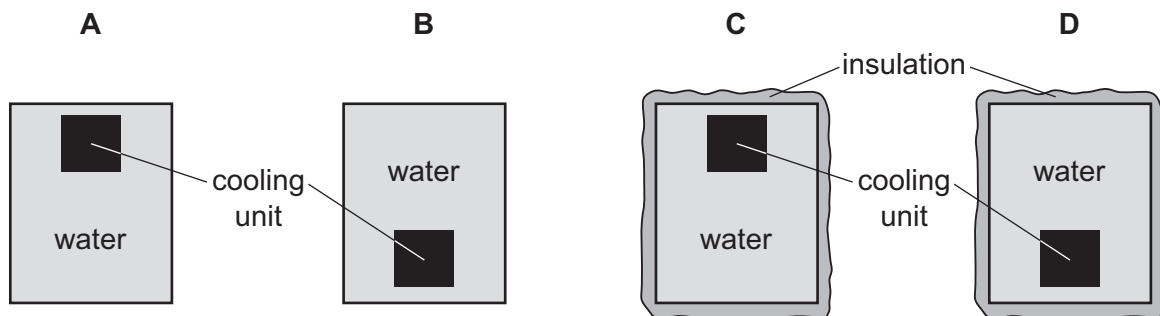
33 Four identical metal tanks in a room each contain the same amount of water.

The water is at the same temperature as the room.

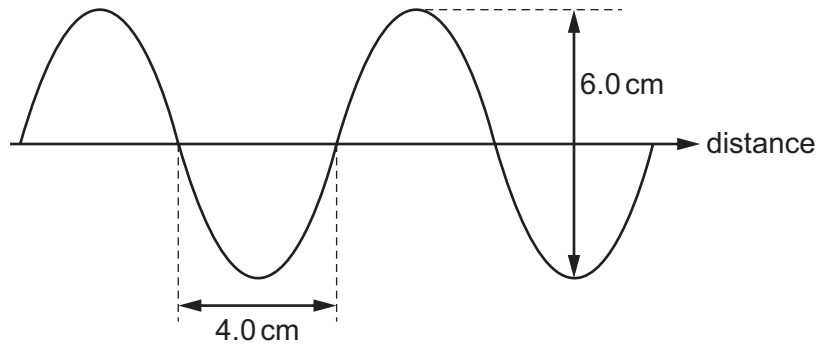
Two of the tanks are insulated, and two of the tanks are not insulated.

A cooling unit is placed in each of the tanks, in the position shown.

In which tank does all the water become cool the most quickly?



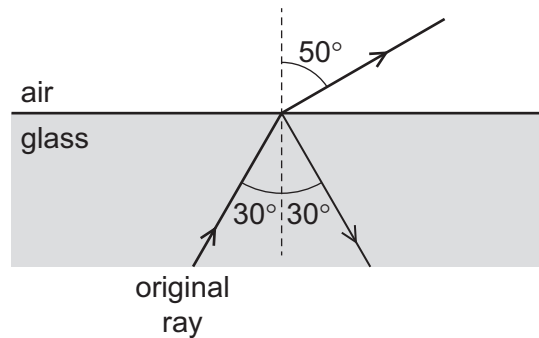
- 34 The diagram represents a wave on the surface of water. Some measurements are shown.



Which row gives the amplitude and the wavelength of the wave?

| | amplitude / cm | wavelength / cm |
|----------|----------------|-----------------|
| A | 3.0 | 4.0 |
| B | 3.0 | 8.0 |
| C | 6.0 | 4.0 |
| D | 6.0 | 8.0 |

- 35 A ray of light is travelling in glass. The ray reaches a boundary with air and splits into two rays as shown.



What has happened to the original ray?

- A** It has been partially internally reflected.
- B** It has been partially internally refracted.
- C** It has been totally internally reflected.
- D** It has been totally internally refracted.

36 Which electromagnetic wave is used by a remote controller for a television?

- A infra-red
- B microwaves
- C radio
- D ultraviolet

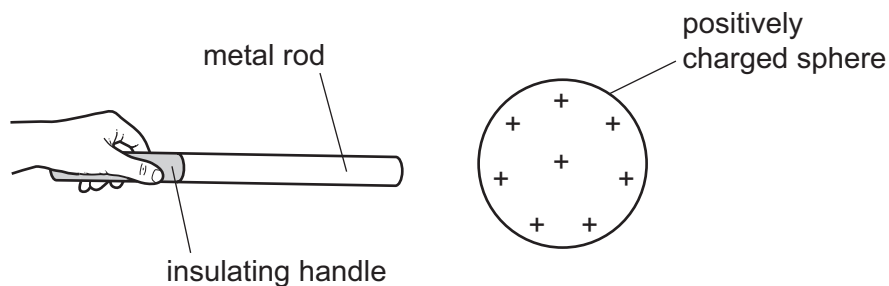
37 An electronic circuit in a fire alarm makes a loudspeaker vibrate alternately at two different frequencies.

Which pair of frequencies is suitable to use in the alarm to alert people to the danger of fire?

- A 1.5 Hz and 15 Hz
- B 15 Hz and 150 000 Hz
- C 150 Hz and 15 000 Hz
- D 150 000 Hz and 15 000 000 Hz

38 An uncharged metal rod is held by an insulating handle.

The rod is brought near to a positively charged sphere. This causes some particles in the rod to move.



Which particles in the rod move and in which direction do the particles move?

| | particles that move | direction of movement |
|----------|---------------------|-----------------------|
| A | electrons | away from the sphere |
| B | electrons | towards the sphere |
| C | protons | away from the sphere |
| D | protons | towards the sphere |

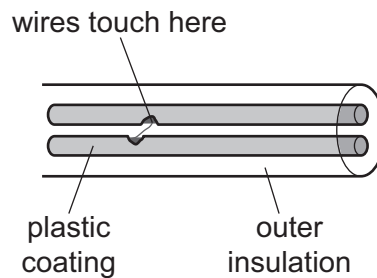
39 A power supply causes a current in a circuit.

The potential difference (p.d.) of the power supply and the resistance of the circuit are both changed.

Which pair of changes **must** result in a smaller current in the circuit?

| | p.d. | resistance |
|----------|-----------|------------|
| A | decreased | decreased |
| B | decreased | increased |
| C | increased | decreased |
| D | increased | increased |

40 Each wire inside a cable leading from an electric socket to a hairdryer is covered with a plastic coating. This plastic coating splits and the two wires inside the cable touch each other.



What could happen because of this?

- A** An appliance plugged into a different socket could become switched on.
- B** A large current could flow in the wires making them overheat to cause a fire.
- C** A person near the hairdryer could receive an electric shock.
- D** The hairdryer plugged into the socket could be damaged.

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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 | | | | | | | |
| 19 K potassium 39 | 20 Ca calcium 40 | 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 | | |
| 37 Rb rubidium 85 | 38 Sr strontium 88 | 31 Ga gallium 70 | 32 Ge germanium 73 | 33 As arsenic 75 | 34 Se selenium 79 | 35 Br bromine 80 | 36 Kr krypton 84 | | |
| 55 Cs caesium 133 | 56 Ba barium 137 | 49 In indium 115 | 50 Sn tin 119 | 51 Sb antimony 122 | 52 Te tellurium 128 | 53 I iodine 127 | 54 Xe xenon 131 | | |
| 87 Fr francium — | 88 Ra radium — | 81 Tl thallium 204 | 82 Pb lead 207 | 83 Bi bismuth 209 | 84 Po polonium — | 85 At astatine — | 86 Rn radon — | | |
| | | 29 Cu copper 64 | 30 Zn zinc 65 | 47 Ag silver 108 | 48 Cd cadmium 112 | 79 Hg mercury 201 | 112 Cn copernicium — | | |
| | | 26 Fe iron 56 | 27 Co cobalt 59 | 28 Ni nickel 59 | 29 Cu copper 64 | 78 Pt platinum 195 | 111 Rg roentgenium — | | |
| | | 25 Mn manganese 55 | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 46 Pd palladium 106 | 80 Hg mercury 201 | 112 Cn copernicium — | | |
| | | 24 Cr chromium 52 | 43 Tc technetium — | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 77 Ir iridium 192 | 109 Mt meitnerium — | | |
| | | 23 V vanadium 51 | 42 Mo molybdenum 96 | 43 Tc technetium — | 44 Ru ruthenium 101 | 76 Os osmium 190 | 108 Hs hassium — | | |
| | | 22 Ti titanium 48 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 43 Tc technetium — | 75 Re rhenium 186 | 107 Bh bohrium — | | |
| | | 21 Sc scandium 45 | 40 Zr zirconium 91 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 74 W tungsten 184 | 106 Sg seaborgium — | | |
| | | 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 |
| | | 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 |
| | | 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 — |
| | | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 | 75 Re rhenium 186 | 76 Os osmium 190 |
| | | 101 Md mendelevium — | 102 No nobelium — | 103 Lr lawrencium — | 104 Rf rutherfordium — | 105 Db dubnium — | 106 Sg seaborgium — | 107 Bh bohrium — | 108 Hs hassium — |
| | | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 | 75 Re rhenium 186 |
| | | 67 Ho holmium 165 | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 |
| | | 66 Dy dysprosium 163 | 67 Ho holmium 165 | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 | 72 Hf hafnium 178 | 73 Ta tantalum 181 |
| | | 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 | 72 Hf hafnium 178 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 |
| | | 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 — |
| | | 88 Ra radium — | 89 Ac actinium — | 90 Th thorium 232 | 91 Pa protactinium 231 | 92 U uranium 238 | 93 Np neptunium — | 94 Pu plutonium — | 95 Am americium — |
| | | 87 Fr francium — | 88 Ra radium — | 89 Ac actinium — | 90 Th thorium 232 | 91 Pa protactinium 231 | 92 U uranium 238 | 93 Np neptunium — | 94 Pu plutonium — |
| | | 116 Lv livermorium — | 117 Ts tennessine — | 118 Og oganesson — | 119 Uue unbinilium — | 120 Uub unbinilium — | 121 Uut ununilium — | 122 Uuq ununilium — | 123 Uuq ununilium — |

| | | | | | | | | | | | | | | | |
|-------------|-------------------------------------|-----------------------------------|--|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|----------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| 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.).