



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice (Core)

October/November 2017

45 minutes

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

* 3 1 3 0 5 3 6 3 2 3 *

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.

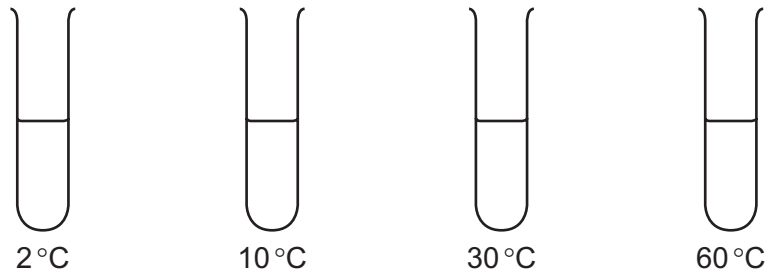
Any rough working should be done in this booklet.

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

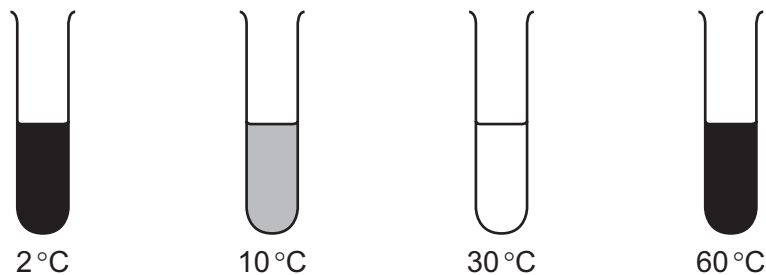
Electronic calculators may be used.

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

- 1 The bicuspid valve in the heart stops blood from flowing in which direction?
- A left atrium to left ventricle
 - B left ventricle to left atrium
 - C right atrium to right ventricle
 - D right ventricle to right atrium
- 2 Four test-tubes contain the same volume of starch suspension but each test-tube is kept at a different temperature, as shown.



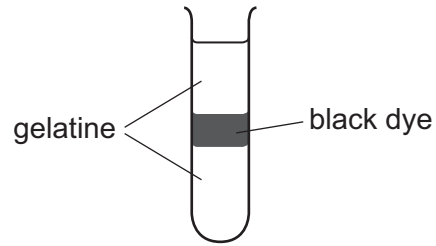
An equal quantity of enzyme is added to each test-tube and, after ten minutes, iodine solution is added to each test-tube. The results are shown below.



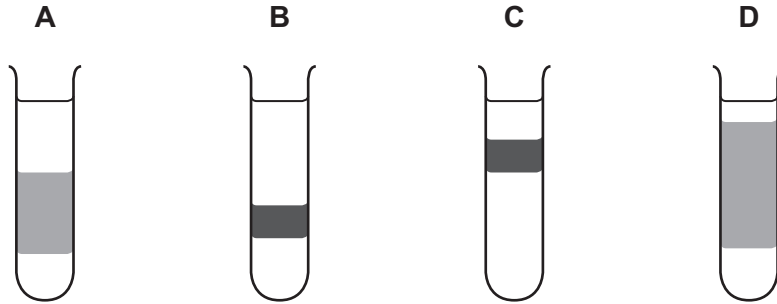
What do the results show?

- A At 2°C the enzyme works slowly.
 - B At 10°C the enzyme does not work.
 - C At 30°C the enzyme works well.
 - D At 60°C the enzyme works best.
- 3 What is homeostasis?
- A the maintenance of the body's external environment
 - B the maintenance of the body's internal environment
 - C the processes that produce heat in the body
 - D the removal of wastes from the body

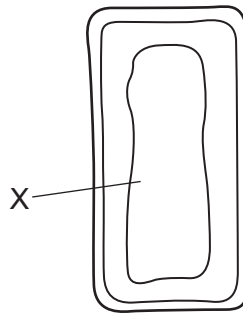
- 4 The test-tube shows gelatine with a layer of black dye. The dye can diffuse through the gelatine.



What was the appearance of the test-tube after six hours?



- 5 The diagram shows parts of a mesophyll cell.

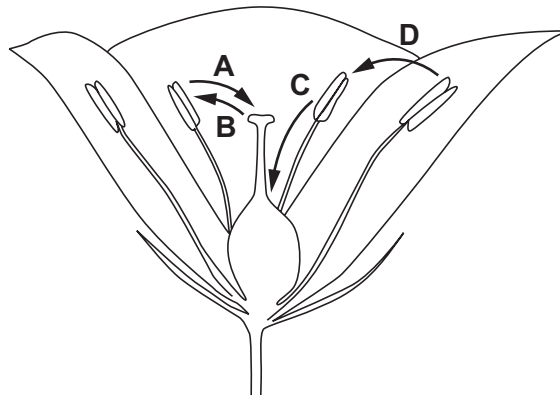


What is found in the part labelled X?

- A chloroplasts and nucleus
- B chloroplasts only
- C nucleus only
- D watery solution

- 6 Self-pollination occurs when pollen is transferred from the male part of a flower to the female part of the same flower.

Which arrow on the diagram shows self-pollination?



- 7 Which statement about food chains is correct?
- A A carnivore is a consumer that gets its energy from plants.
 - B A carnivore is a producer that gets its energy from animals.
 - C A herbivore is a consumer that gets its energy from plants.
 - D A herbivore is a producer that gets its energy from animals.

- 8 Food tests are performed on four substances.

Which substance contains fat and protein?

	test reagent			
	Benedict's	biuret	ethanol	iodine
A	✓	✓	x	x
B	✓	x	x	✓
C	x	✓	✓	x
D	x	x	✓	✓

key

✓ = positive test result

x = negative test result

- 9 Which substance causes an increase in blood glucose concentration?
- A adrenaline
 - B insulin
 - C oxygen
 - D vitamin C

10 Humans must breathe air so that respiration can take place to release energy.

Which gas in the air we breathe is needed to do this?

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

11 Predators that hunt at night have large eyes and ears.

This has resulted from the passing on of genes by the best-adapted organisms.

What is this process called?

- A artificial selection
- B conservation
- C homeostasis
- D natural selection

12 Which statements about X chromosomes in humans are correct?

	present in body cells in males	present in body cells of females	carry genes
A	✓	✓	✓
B	✓	x	✓
C	✓	x	x
D	x	✓	x

13 Plants release oxygen as a waste product of photosynthesis.

Which characteristic of living organisms does this demonstrate?

- A excretion
- B growth
- C nutrition
- D reproduction

14 Which statement about atoms and molecules is correct?

- A All molecules are gases at room temperature and pressure.
- B Atoms are the smallest part of an element.
- C Atoms of the same element all have the same mass.
- D Molecules always contain atoms of more than one element.

15 Excess copper sulfate is mixed with water.

The mixture is filtered and the filtrate is distilled.

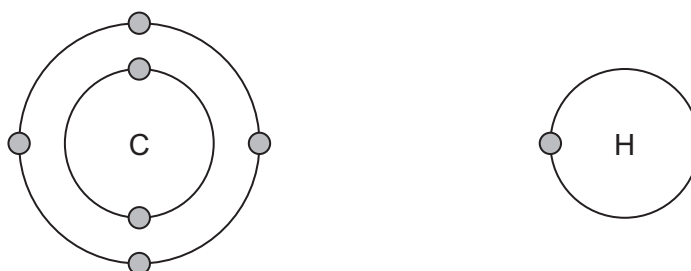
What are the colours of the solid left in the filter and the liquid collected after distillation?

	solid	liquid collected after distillation
A	blue	blue
B	blue	colourless
C	colourless	blue
D	colourless	colourless

16 Which statement about fractional distillation is correct?

- A A chemical change occurs because new substances are formed.
- B A chemical change occurs because no new substances are formed.
- C A physical change occurs because new substances are formed.
- D A physical change occurs because no new substances are formed.

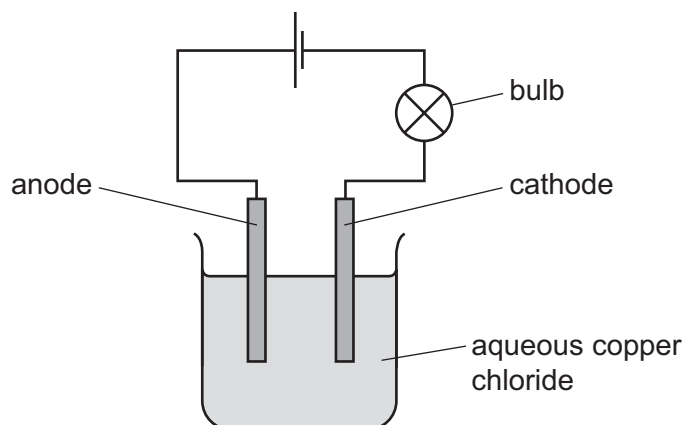
17 The electronic structures of carbon and of hydrogen are shown.



What is the formula of a compound formed between carbon and hydrogen?

- A CH₂
- B CH₃
- C CH₄
- D C₄H

18 The electrolysis of aqueous copper chloride is shown. Inert electrodes are used.



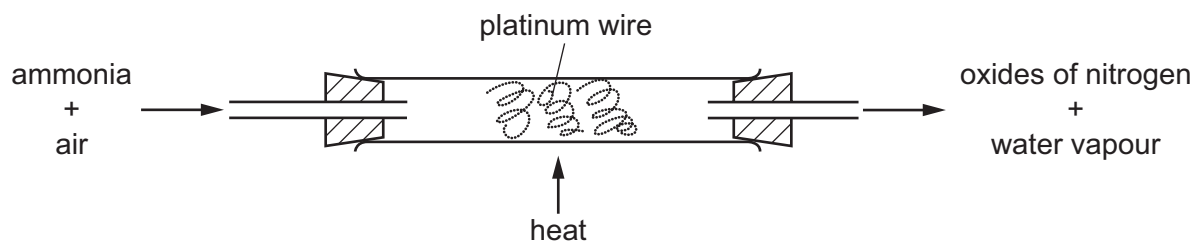
What is produced at the cathode?

- A chlorine
 - B copper
 - C hydrogen
 - D oxygen
- 19 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

Which observation shows that the process is exothermic?

- A A blue solution forms.
- B A colourless solution forms.
- C The beaker becomes cooler.
- D The beaker becomes warmer.

20 Ammonia is oxidised as shown.



The platinum is chemically unchanged at the end of the reaction.

What is the reason for using platinum?

- A to absorb the heat from the reaction
 - B to filter out oxygen from the air
 - C to increase the rate of the reaction
 - D to neutralise the ammonia
- 21 In which reaction do both oxidation and reduction occur?
- A copper chloride + sodium hydroxide → copper hydroxide + sodium chloride
 - B hydrochloric acid + sodium hydroxide → sodium chloride + water
 - C iron oxide + carbon → iron + carbon dioxide
 - D silver nitrate + potassium chloride → silver chloride + potassium nitrate
- 22 Which substances react with dilute sulfuric acid to form a salt?

	magnesium	magnesium oxide	magnesium carbonate	magnesium chloride
A	✓	✓	✓	x
B	✓	✓	x	✓
C	✓	x	✓	✓
D	x	✓	✓	✓

23 Substance X is tested using aqueous barium ions under acidic conditions.

A white precipitate forms.

Which anion is present in X?

- A** ammonium
- B** carbonate
- C** nitrate
- D** sulfate

24 Sodium is a metal in Group I of the Periodic Table.

Some of the properties of sodium are listed.

- 1 It conducts electricity.
- 2 It forms white compounds.
- 3 It forms a basic oxide.
- 4 It is malleable.

Nickel is a transition metal.

Which properties are shown by nickel as well as by sodium?

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

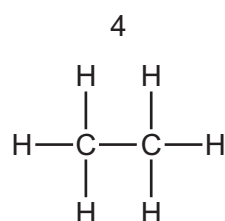
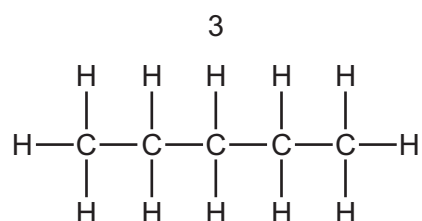
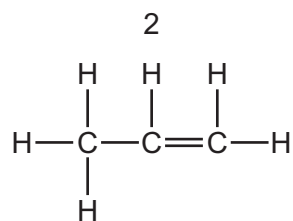
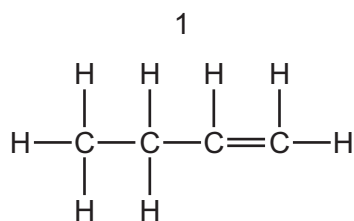
25 Which gas is formed when ammonium nitrate is warmed with aqueous sodium hydroxide?

- A** ammonia
- B** ammonium
- C** nitrogen
- D** nitrogen dioxide

26 Which word equation describes the manufacture of lime from limestone?

- A** calcium carbonate \rightarrow calcium hydroxide + carbon dioxide
- B** calcium carbonate \rightarrow calcium oxide + carbon dioxide
- C** calcium hydroxide \rightarrow calcium oxide + water
- D** calcium oxide + carbon dioxide \rightarrow calcium carbonate

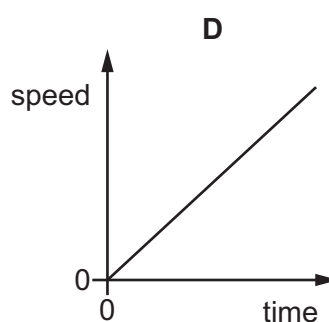
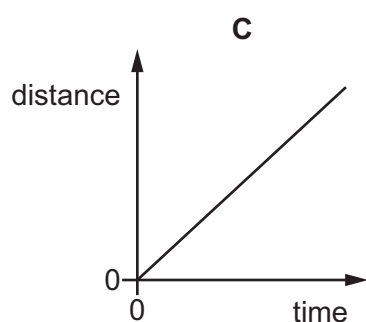
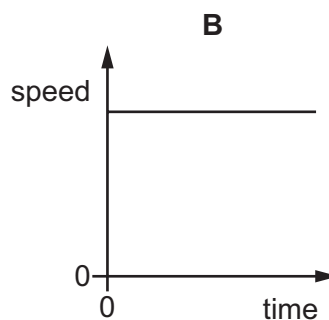
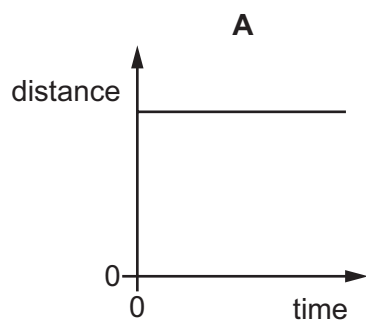
27 The structures of four hydrocarbons are shown.



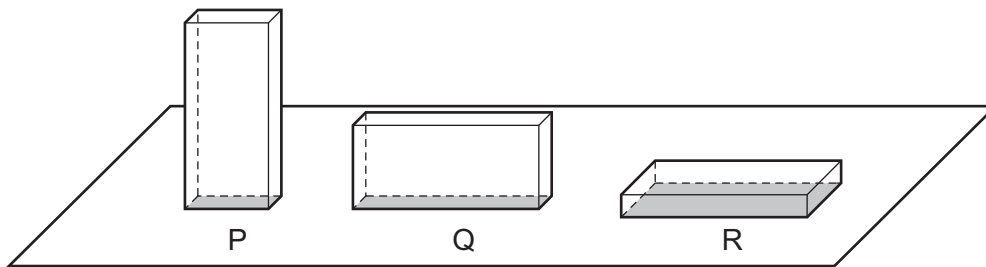
Which of the hydrocarbons change the colour of aqueous bromine?

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

28 Which graph represents the motion of an object that is accelerating?

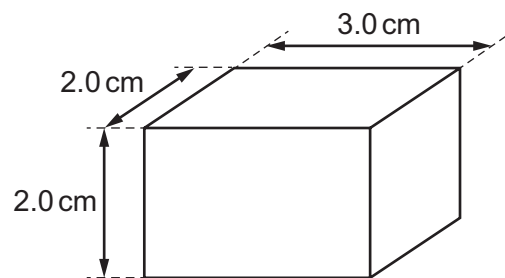


- 29 The scale diagram shows three identical solid blocks P, Q and R. The blocks have different areas of contact with the ground.



Which block exerts the greatest pressure on the ground?

- A block P
 - B block Q
 - C block R
 - D they all exert the same pressure
- 30 The diagram shows a solid rectangular block made of material of density 2.0 g/cm^3 .



What is the mass of the block?

- A 2.0g
- B 6.0g
- C 14g
- D 24g

31 A worker carries bricks up a ladder.

The following quantities are known.

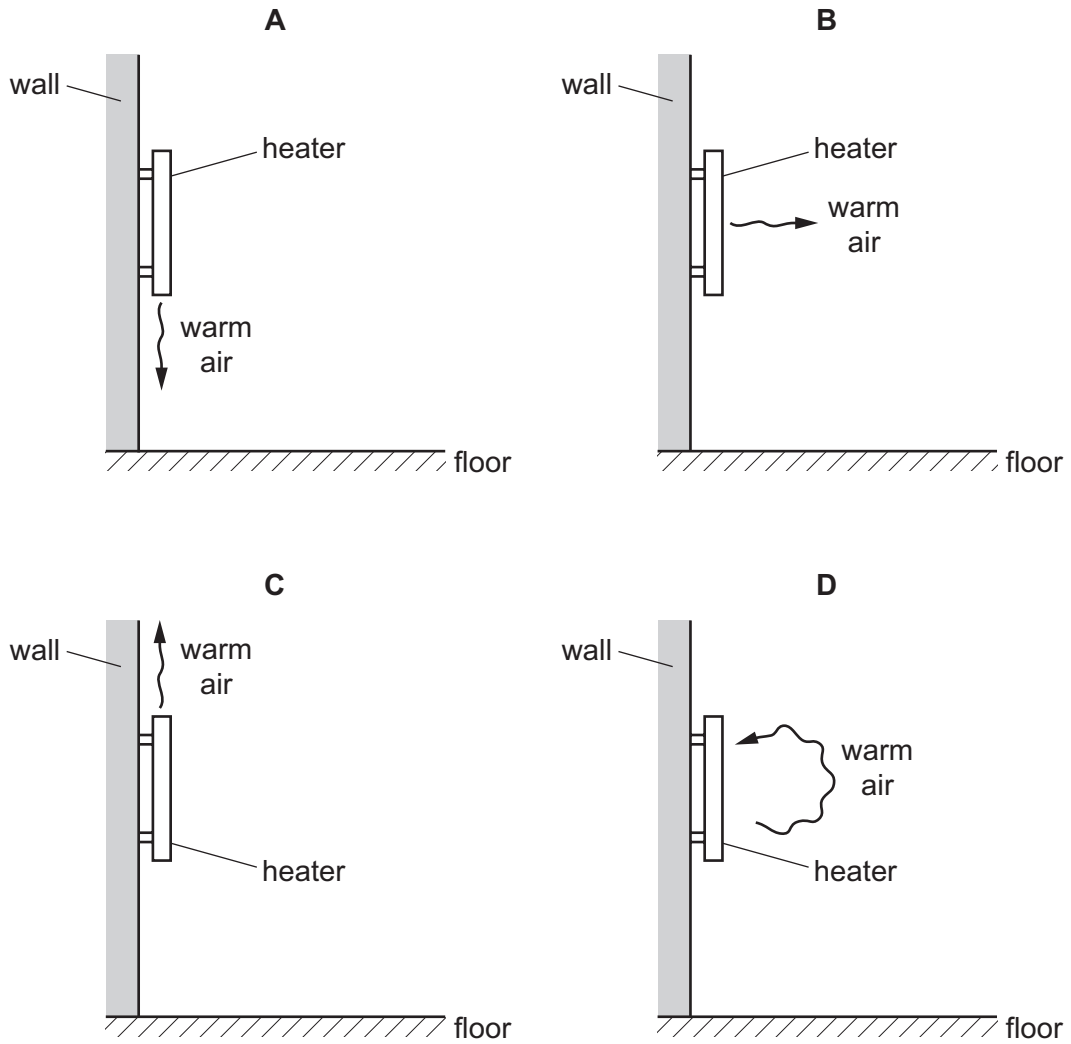
- the height the bricks are lifted up
- the time taken for the worker to lift the bricks
- the volume of the bricks
- the weight of the bricks

Which quantities are needed to calculate the useful power produced by the worker as he carries the bricks up the ladder?

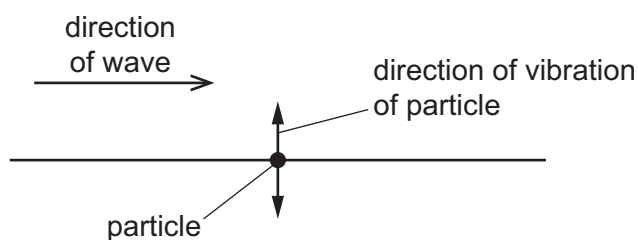
- A** height, time and volume
- B** height, time and weight
- C** height, volume and weight
- D** time, volume and weight

32 A convector heater is fixed to a wall.

Which diagram shows how warm air near the heater moves because of convection in the air?



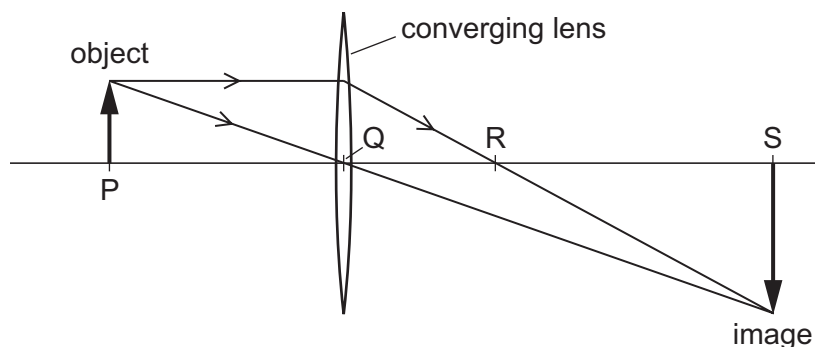
- 33 The diagram shows the direction of a wave that passes a particle. The particle is made to vibrate by the wave. The direction of vibration of the particle is shown.



Which row states the type of wave that passes the particle, and gives an example of this type of wave?

	type of wave	example
A	longitudinal	light
B	longitudinal	sound
C	transverse	light
D	transverse	sound

- 34 The diagram represents a converging lens forming an image of an object.



Which distance is the focal length of the lens?

- A** PQ **B** PR **C** QR **D** QS
- 35 Which type of electromagnetic wave is emitted by a television remote controller?

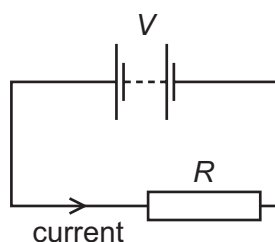
- A** infra-red
B radio
C visible light
D X-rays

- 36 A student claps his hands once when standing 100 m away from a large wall.

The speed of sound in air is 330 m/s.

How long after clapping does the student hear an echo?

- A 0.30 s B 0.61 s C 1.7 s D 3.3 s
- 37 A battery of e.m.f. V is connected across a resistor of resistance R . There is a current in the resistor.



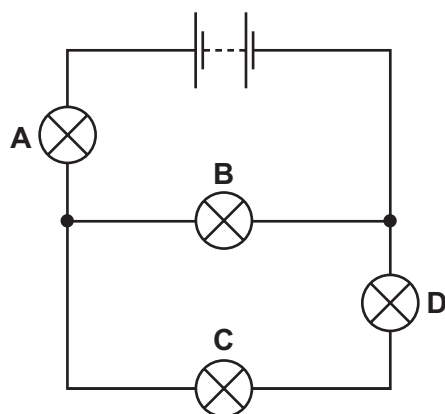
Which row shows two changes that **both** increase the current in the resistor?

	change 1	change 2
A	decrease V	decrease R
B	decrease V	increase R
C	increase V	decrease R
D	increase V	increase R

- 38 The circuit shows a battery and four lamps. All the lamps are lit.

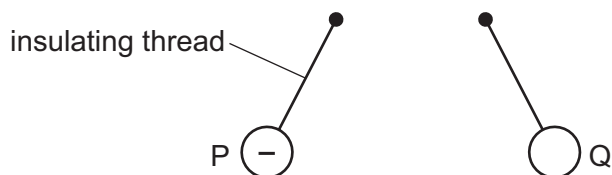
One lamp fails and all the lamps go out.

Which lamp failed?

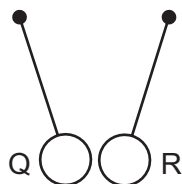


- 39 Three charged balls P, Q and R are suspended by insulating threads. Ball P is negatively charged.

Ball Q is brought close to ball P. The balls move away from each other.



Ball Q is now brought close to ball R. The balls move closer to each other.



What are the signs of the charges on ball Q and ball R?

	ball Q	ball R
A	negative	negative
B	negative	positive
C	positive	negative
D	positive	positive

- 40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?

A **B**

C **D**

key
 ○ neutron
 ● proton

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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	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 —	114 Fl flerovium —	116 Lv livermorium —						

1
H
hydrogen
1

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 dm³ at room temperature and pressure (r.t.p.).