

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/01

Paper 1 Multiple Choice

October/November 2006

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, highlighters, 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.

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.

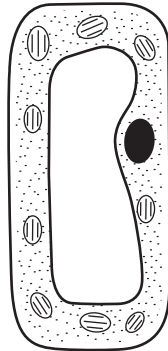
This document consists of **18** printed pages and **2** blank pages.



- 1 A fossil shows evidence of an organism with scaly skin, a tail and four legs.

In which group would the organism be classified?

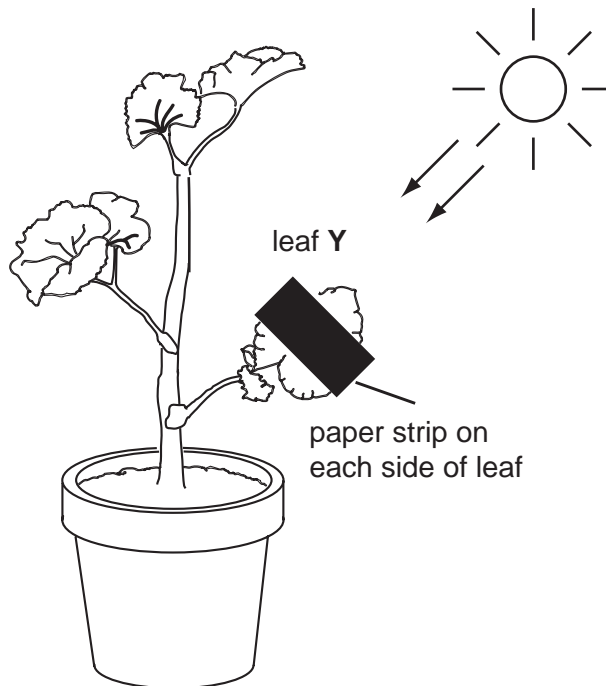
- A amphibians
 - B fish
 - C mammals
 - D reptiles
- 2 The diagram shows an incomplete plant cell.



Which structure is **not** shown?

- A cell membrane
 - B cell wall
 - C chloroplast
 - D vacuole
- 3 Which two parts of the eye help to focus light rays?
- A cornea and iris
 - B cornea and lens
 - C iris and retina
 - D lens and retina

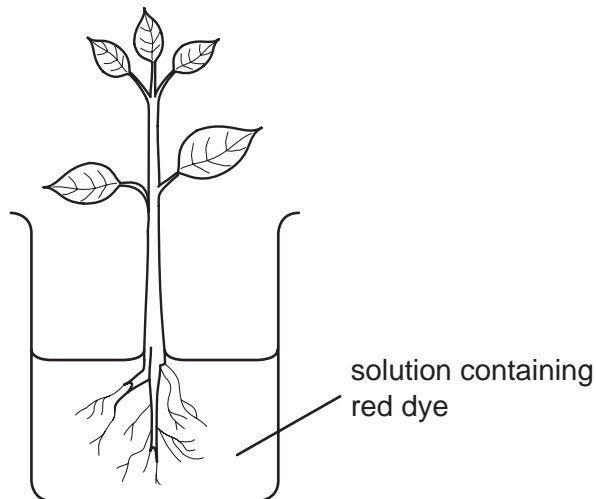
- 4 An experiment is set up as shown to investigate starch production in the leaves of a plant. After six hours in sunlight, leaf Y is tested for starch.



There is no starch produced under the paper strip because there was an absence of

- A carbon dioxide.
- B chlorophyll.
- C light.
- D oxygen.

- 5 Roots of a seedling are placed in a solution containing red dye.



What is the path of the red dye after it has entered the roots?

- A phloem in root → phloem in stem
 - B phloem in root → xylem in stem
 - C xylem in root → phloem in stem
 - D xylem in root → xylem in stem
- 6 Which sequence shows the correct order of structures through which air passes when we breathe in?
- A alveolus → bronchiole → trachea → bronchus
 - B bronchus → trachea → alveolus → bronchiole
 - C bronchiole → alveolus → bronchus → trachea
 - D trachea → bronchus → bronchiole → alveolus

- 7 The table shows the amount of protein and fat in 100g samples of different foods.

foods	protein /g	fat /g
meat	18.0	17.0
bread	9.0	1.5
fish	18.0	0.5
eggs	13.0	11.0
potato chips	4.0	9.0

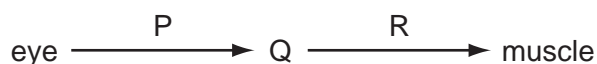
Which foods are best for body-building?

- A** bread and meat
B bread and potato chips
C meat and eggs
D meat and fish
- 8 Calcium and iron are components of the diet.

Which parts of the body need these components?

	dietary component	
	calcium	iron
A	blood	bone
B	blood	skin
C	bone	blood
D	skin	bone

- 9 The diagram shows how the eye and a muscle of a person are linked when responding to a change in the environment.

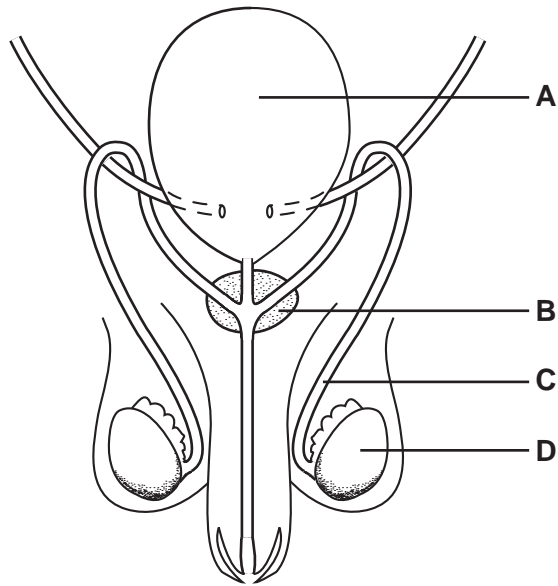


What do P, Q and R represent?

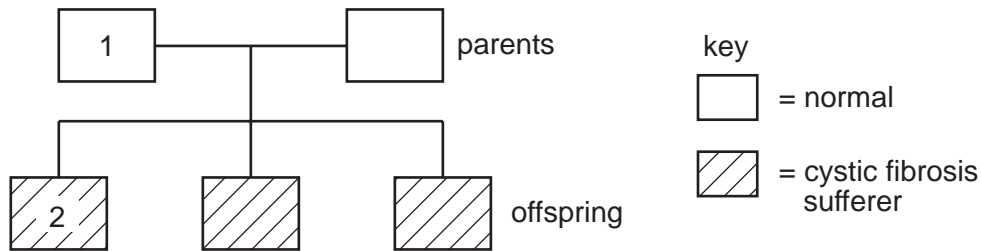
	P	Q	R
A	effector	stimulus	receptor
B	impulses	central nervous system	impulses
C	receptor	central nervous system	effector
D	stimulus	receptor	effector

10 The diagram shows the male reproductive system.

In which structure are hormones produced that control adolescence?



11 Cystic fibrosis is an inherited disease. The diagram shows the occurrence of this disease in a family.



If B represents the normal allele and b the allele for cystic fibrosis, what are the genotypes for 1 and 2?

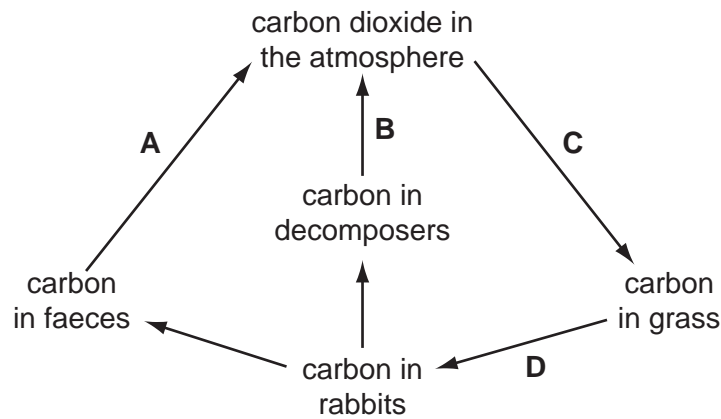
	individual 1	individual 2
A	bb	bb
B	Bb	bb
C	Bb	Bb
D	BB	Bb

12 Which process converts energy into a form that can be used by all living organisms?

- A** decomposition
- B** denitrification
- C** digestion
- D** photosynthesis

13 The diagram shows a simple carbon cycle.

Which line should have an arrow at both ends?



14 Which row in the table shows the relative charge of an electron and of a neutron?

	electron	neutron
A	+1	0
B	+1	-1
C	-1	0
D	-1	+1

15 An element is in Group VI of the Periodic Table.

What information does this give about the element?

- A** the number of protons in the nucleus
- B** the number of outer electrons
- C** the reactivity of the element
- D** the relative atomic mass of the element

16 Which process would show that crude oil is a mixture?

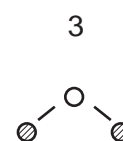
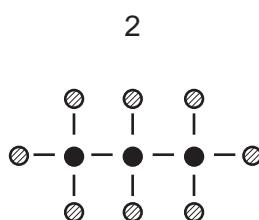
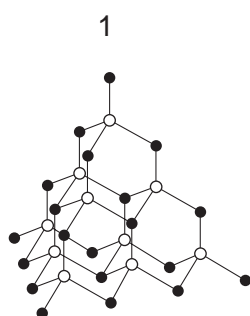
- A** combustion
- B** cracking
- C** fractional distillation
- D** neutralisation

17 Crude oil, salt and wood are important raw materials used in industry.

Which of these raw materials is used to make alkali, paper and plastics?

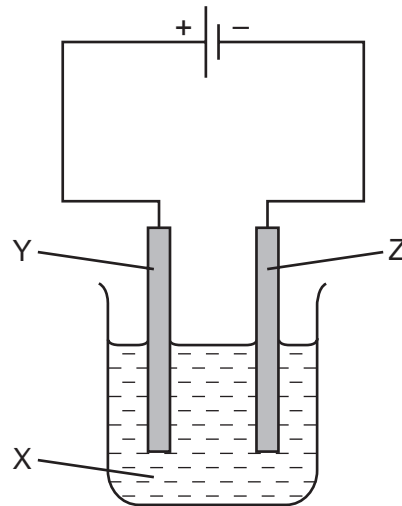
	alkali	paper	plastics
A	crude oil	wood	salt
B	salt	crude oil	wood
C	salt	wood	crude oil
D	wood	salt	crude oil

18 Which diagrams show a giant molecular structure?



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

19 The diagram shows apparatus used for electrolysis.



Which row shows the correct labelling for the apparatus?

	anode	cathode	electrolyte
A	X	Y	Z
B	X	Z	Y
C	Y	X	Z
D	Y	Z	X

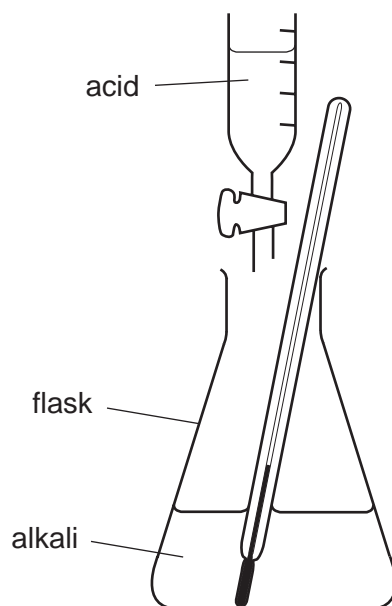
20 When some hard water is boiled in a kettle, a white scale forms inside the kettle.

Which two of the following statements are correct?

- 1 The hard water contains dissolved calcium carbonate.
- 2 The hard water contains dissolved calcium hydrogencarbonate.
- 3 The white scale contains calcium carbonate.
- 4 The white scale contains calcium hydrogencarbonate.

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

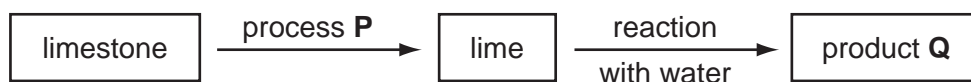
21 The diagram shows acid being added to an alkali until it is neutralised.



What happens in the flask?

	temperature	type of reaction
A	decreases	endothermic
B	decreases	exothermic
C	increases	endothermic
D	increases	exothermic

22 The diagram shows how limestone can be converted into useful products for industry.



What are process **P** and product **Q**?

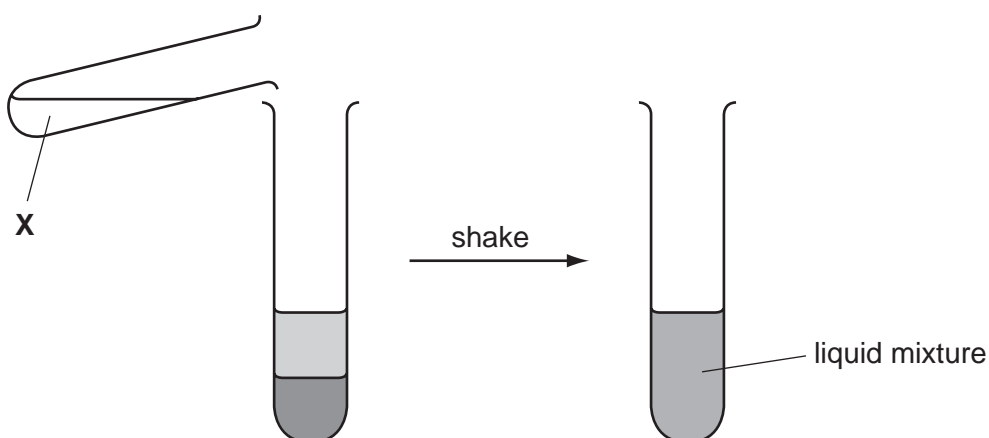
	P	Q
A	combustion	an acid
B	combustion	an alkali
C	decomposition	an acid
D	decomposition	an alkali

23 A small amount of ammonia is present in a sample of hydrogen.

What would be the results of tests on the mixture?

	damp blue litmus	lighted splint
A	stays blue	no effect
B	stays blue	pops
C	turns red	no effect
D	turns red	pops

24 A medicine contains two liquids that do not normally mix. Adding a small amount of liquid **X** helps to make the liquids mix.



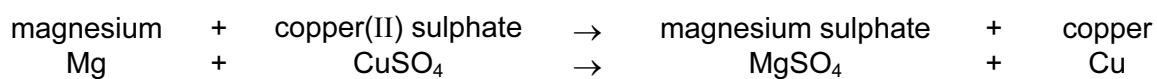
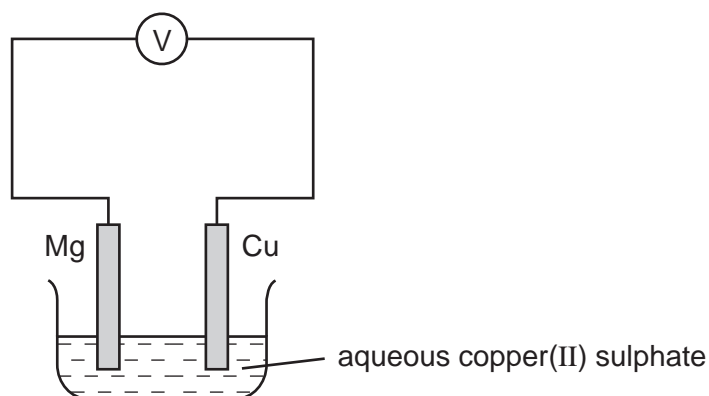
Which word best describes liquid **X**?

- A** analgesic
 - B** antacid
 - C** catalyst
 - D** emulsifier
- 25 Water is used to put out forest fires by spraying it on to the fire from aeroplanes.

Why is water used for this purpose?

- A** Water boils at 100 °C.
- B** Water cools the fire.
- C** Water is a good solvent.
- D** Water is a reducing agent.

- 26 In the simple cell shown, magnesium dissolves from the magnesium electrode and copper is deposited on the copper electrode.



It can be deduced that magnesium is1.... reactive than copper and that the mass of the deposited copper is2.... the mass of the dissolved magnesium.

Which words correctly complete gaps 1 and 2?

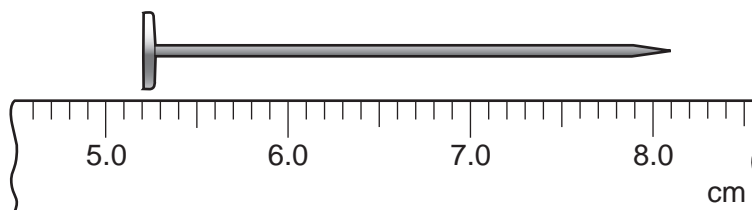
	gap 1	gap 2
A	less	more than
B	less	the same as
C	more	more than
D	more	the same as

- 27 Substance **R** has a high melting point and reacts with an acid to produce hydrogen.

What does this show about substance **R**?

	metal or non-metal	structure
A	metal	giant
B	metal	molecular
C	non-metal	giant
D	non-metal	molecular

28 A ruler is used to measure the length of a nail.



What is the length of the nail?

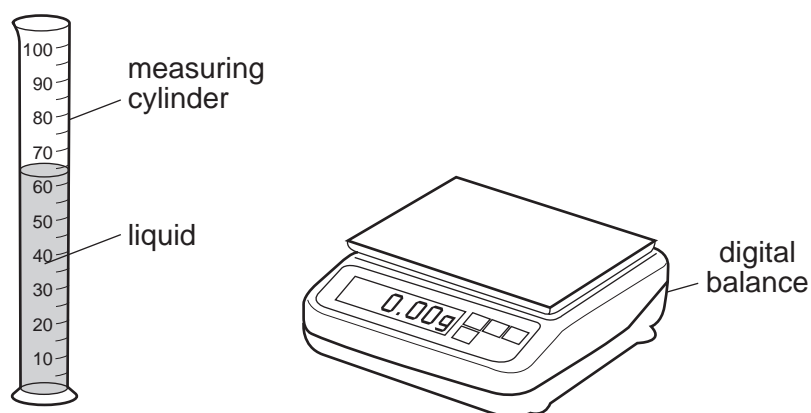
- A** 1.3 cm **B** 2.9 cm **C** 5.2 cm **D** 8.1 cm

29 A newton is a unit of force.

Which quantity is measured in newtons?

- A** acceleration
B density
C mass
D weight

30 A student pours liquid into a measuring cylinder.



The student records the volume of the liquid from the scale on the measuring cylinder. He then puts the measuring cylinder containing the liquid on a balance and records the mass.

What else needs to be measured before the density of the liquid can be calculated?

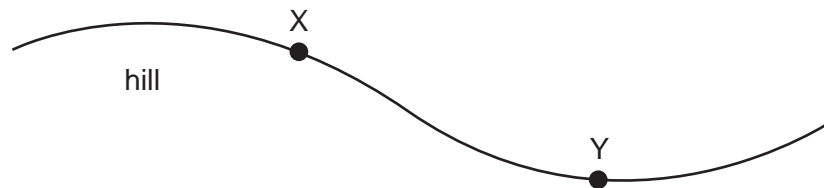
- A** the depth of the liquid in the measuring cylinder
B the mass of the empty measuring cylinder
C the temperature of the liquid in the measuring cylinder
D the volume of the empty measuring cylinder

31 Which source of energy uses the production of steam to generate electricity?

- A hydroelectric
- B nuclear
- C tides
- D waves

32 A cyclist travels down a hill from rest at point X without pedalling.

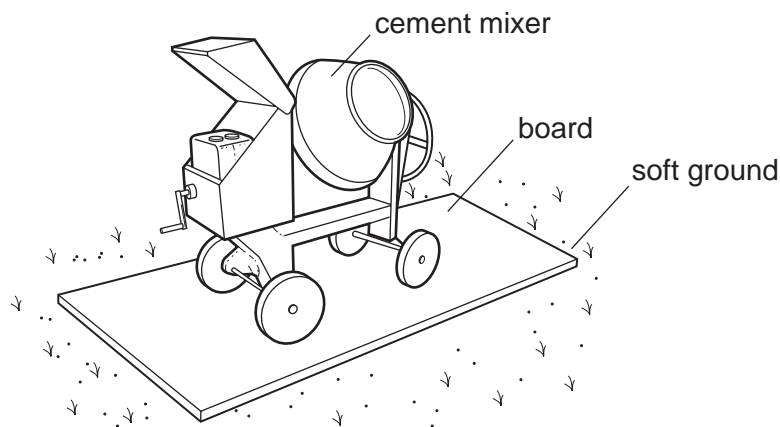
The cyclist applies his brakes and the cycle stops at point Y.



Which energy changes have taken place between X and Y?

- A kinetic \rightarrow internal (heat) \rightarrow gravitational potential
- B kinetic \rightarrow gravitational potential \rightarrow internal (heat)
- C gravitational potential \rightarrow internal (heat) \rightarrow kinetic
- D gravitational potential \rightarrow kinetic \rightarrow internal (heat)

33 To prevent a cement mixer sinking into soft ground, the mixer is placed on a large flat board.



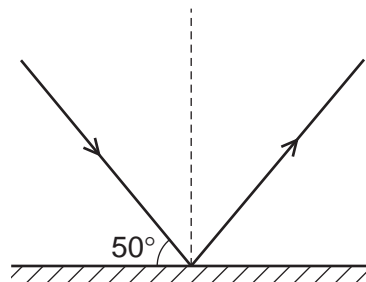
Why does this prevent the mixer sinking?

- A The large area decreases the pressure on the ground.
- B The large area increases the pressure on the ground.
- C The large area decreases the weight on the ground.
- D The large area increases the weight on the ground.

34 Which line in the table is correct about conduction and convection?

	conduction	convection
A	can happen in a solid	can happen in a solid
B	can happen in a solid	only happens in fluids
C	only happens in fluids	can happen in a solid
D	only happens in fluids	only happens in fluids

35 The diagram shows a ray of light striking a plane mirror.



What is the angle of reflection?

- A** 40° **B** 50° **C** 80° **D** 130°

36 A student wishes to measure the electromotive force (e.m.f.) of a battery and the potential difference (p.d.) across a resistor.

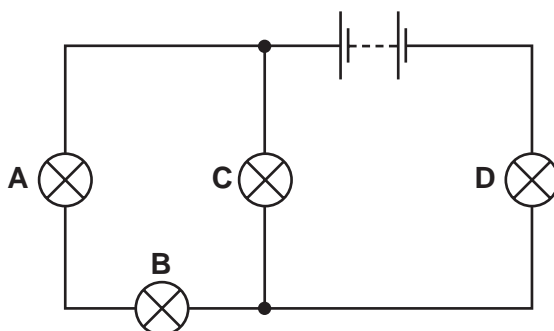
She has the resistor, the battery and some connecting wires.

What else does she need?

- A** a voltmeter only
B an ammeter only
C an ammeter and a voltmeter
D a force meter (newton meter) and a voltmeter

37 In the circuit below, one of the lamps breaks, causing all the other lamps to go out.

Which lamp breaks?

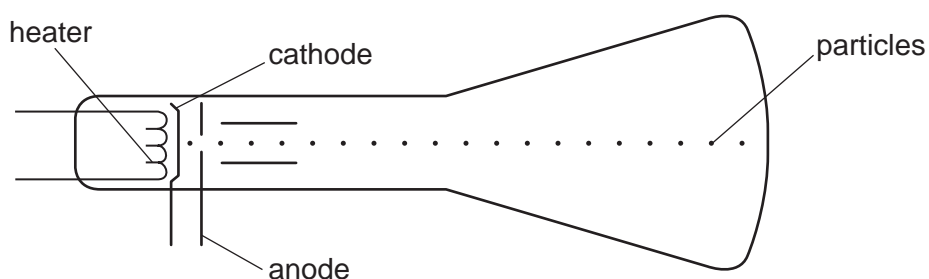


38 An electric heater is connected to the mains, using insulated copper wires. The wires become very warm.

What can be done to prevent so much heat being produced in the connecting wires?

- A Use thicker copper wires.
- B Use thinner copper wires.
- C Use thicker insulation.
- D Use thinner insulation.

39 Particles are emitted by a heated cathode in a cathode-ray tube.



What are these particles?

- A atoms
- B electrons
- C neutrons
- D protons

40 Which line in the table describes the nature of alpha radiation and of gamma radiation?

	alpha radiation	gamma radiation
A	helium nuclei	electromagnetic waves
B	helium nuclei	electrons
C	protons	electromagnetic waves
D	protons	electrons

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DATA SHEET
The Periodic Table of the Elements

		Group																															
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII																						
7 Li Lithium 3	9 Be Beryllium 4	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td>1 H Hydrogen 1</td> <td colspan="10"></td> </tr> <tr> <td>11 B Boron 5</td> <td>12 C Carbon 6</td> <td>13 Al Aluminium 13</td> <td>14 Si Silicon 14</td> <td>15 P Phosphorus 15</td> <td>16 S Sulphur 16</td> <td>17 Cl Chlorine 17</td> <td>18 Ar Argon 18</td> <td>19 F Fluorine 9</td> <td>20 Ne Neon 10</td> </tr> </table>										1 H Hydrogen 1											11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 F Fluorine 9	20 Ne Neon 10	2 He Helium 2
1 H Hydrogen 1																																	
11 B Boron 5	12 C Carbon 6	13 Al Aluminium 13	14 Si Silicon 14	15 P Phosphorus 15	16 S Sulphur 16	17 Cl Chlorine 17	18 Ar Argon 18	19 F Fluorine 9	20 Ne Neon 10																								
23 Na Sodium 11	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	35.5 Cl Chlorine 17	40 Ar Argon 18	35.5 Cl Chlorine 17	40 Ar Argon 18																						
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Co Cobalt 27	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	84 Kr Krypton 36	84 Kr Krypton 36	84 Kr Krypton 36													
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	101 Ru Ruthenium 44	103 Rh Rhodium 45	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54	131 Xe Xenon 54	131 Xe Xenon 54	131 Xe Xenon 54													
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 Po Polonium 84	210 Po Polonium 84	210 Po Polonium 84	210 Po Polonium 84													
87 Fr Francium	88 Ra Radium	89 Ac Actinium										86 Rn Radon																					

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	144 Nd Neodymium 60	150 Sm Samarium 62	150 Sm Samarium 62	152 Eu Europium 63	152 Eu Europium 63	157 Gd Gadolinium 64	157 Gd Gadolinium 64	159 Tb Terbium 65	159 Tb Terbium 65	162 Dy Dysprosium 66	162 Dy Dysprosium 66	165 Ho Holmium 67	165 Ho Holmium 67	167 Er Erbium 68	167 Er Erbium 68	169 Tm Thulium 69	169 Tm Thulium 69	173 Yb Ytterbium 70	173 Yb Ytterbium 70	175 Lu Lutetium 71	175 Lu Lutetium 71
232 Th Thorium 90	232 Th Thorium 90	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92	238 U Uranium 92

a	X	b
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* 58-71 Lanthanoid series
† 90-103 Actinoid series

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

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