



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/12**

Paper 1 Multiple Choice

**May/June 2010**

**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.

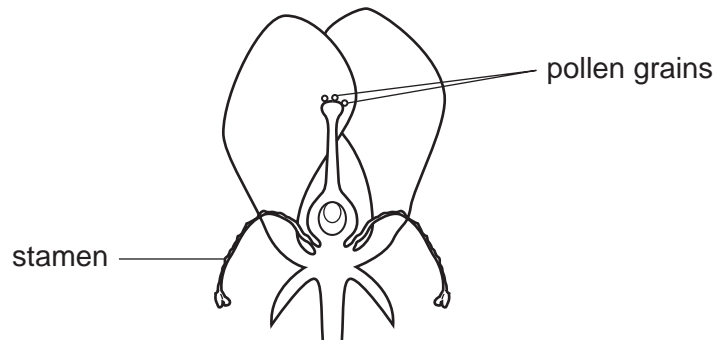
Any rough working should be done in this booklet.

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

This document consists of **19** printed pages and **1** blank page.



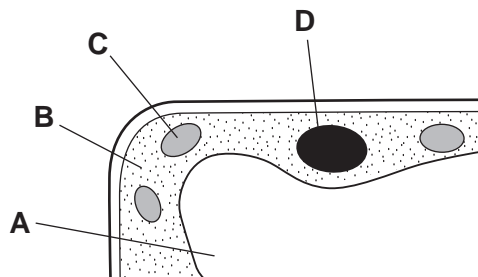
- 1 The diagram shows a flower whose stamens are dying.



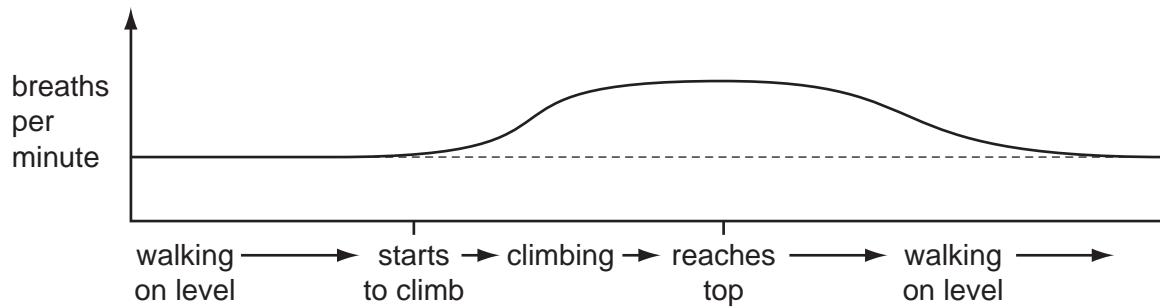
Which process has occurred in this flower?

- A fruit formation
  - B pollination
  - C seed formation
  - D wind dispersal
- 2 Which part of the gut is in the form of a coiled tube?
- A large intestine
  - B oesophagus
  - C rectum
  - D small intestine
- 3 The diagram shows part of a plant cell.

In which region does most of the cell's respiration occur?



- 4 The graph shows changes in his rate of breathing as a boy first walks on the level then climbs a long stair and then walks on the level again.



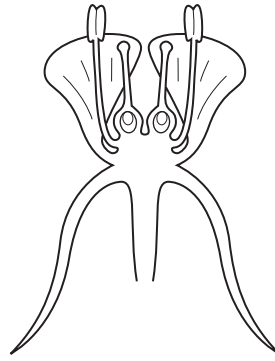
Why does his breathing continue for a while at the higher rate after he reaches the top of the stairs?

- A He is oxidising lactic acid.
  - B He still needs more energy.
  - C His breathing muscles respond slowly.
  - D More glucose is being used up.
- 5 The allele for red hair is recessive.

If a girl has red hair, which statement about her parents must be correct?

- A Both parents must carry a recessive allele.
- B Both parents must have red hair.
- C One parent must carry a dominant allele.
- D The father must have red hair.

6 The diagram shows a section through a flower.

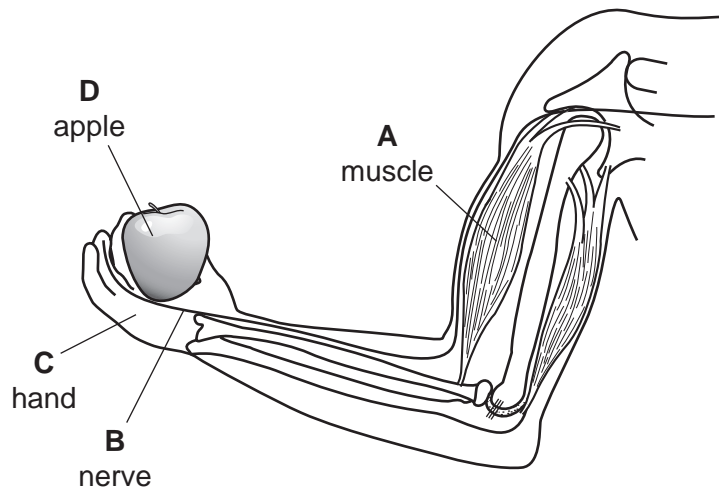


Use the key to identify the flower.

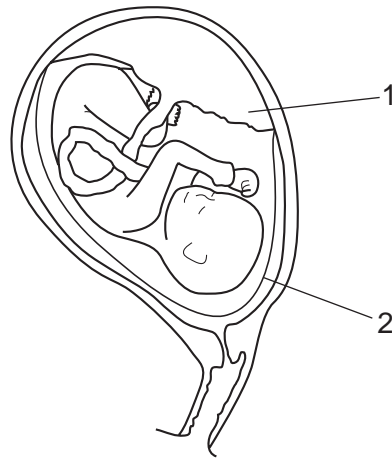
- |   |   |          |
|---|---|----------|
| 1 | flower with many ovules in each ovary ..... | go to 2  |
|   | flower with one ovule in each ovary .....   | go to 3  |
| 2 | filaments longer than styles .....          | <b>A</b> |
|   | filaments shorter than styles .....         | <b>B</b> |
| 3 | petals shorter than sepals .....            | <b>C</b> |
|   | petals longer than sepals .....             | <b>D</b> |

7 The diagram shows a person holding an apple.

If the person decides to lift the apple, which labelled part is the effector?



8 The diagram shows a human embryo inside a uterus.



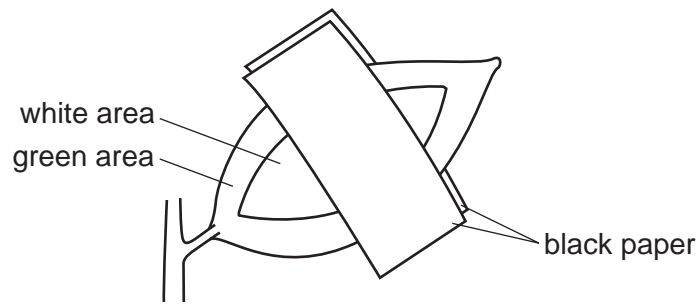
What are the functions of the numbered parts?

	1	2
<b>A</b>	hold the embryo in place	make blood for the embryo
<b>B</b>	protect the embryo	remove waste
<b>C</b>	provide food	provide food
<b>D</b>	remove waste	protect the embryo

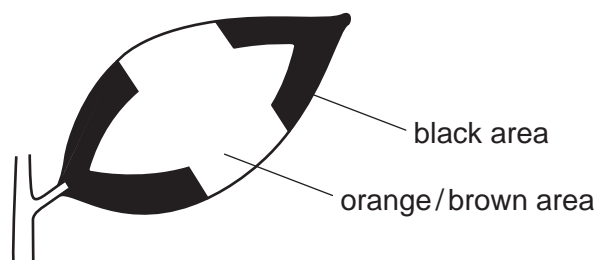
9 What would be the effect on the blood of an over-secretion of insulin?

- A** high levels of glucose
- B** high levels of urea
- C** low levels of glucose
- D** low levels of urea

- 10 A plant, each leaf of which is green and white, is destarched. It is then placed in light with black paper over part of one leaf as shown.



After 12 hours, the leaf is tested for starch using iodine solution. The diagram below shows the leaf after this test.

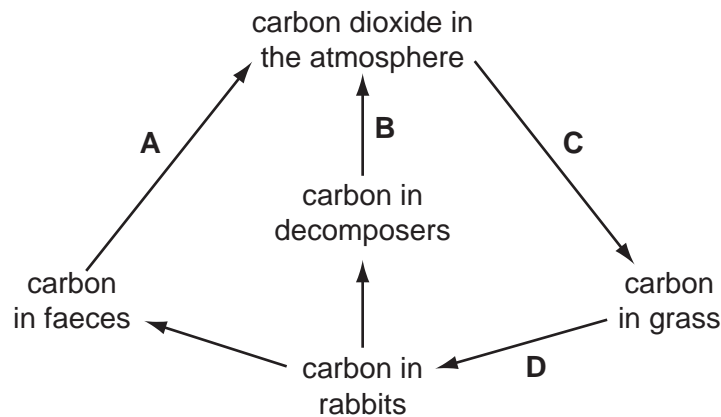


Where has photosynthesis occurred?

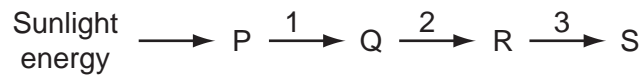
- A all areas covered by black paper
  - B all areas not covered by black paper
  - C green areas covered by black paper
  - D green areas not covered by black paper
- 11 In a balanced diet, which constituents provide most energy?
- A carbohydrate and protein
  - B fat and carbohydrate
  - C fat and fibre
  - D vitamins and protein

12 The diagram shows a simple carbon cycle.

Which line should have an arrowhead at both ends?



13 The diagram shows a food chain.



Where do energy losses occur?

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

14 During the weathering of rocks, which process does **not** take place?

- A** chemical change  
**B** fixation of nitrogen  
**C** physical change  
**D** release of salts into the soil

15 When element X reacts with element Y, X donates an electron to Y.

Which row correctly shows the type of ion that Y forms and how its position in the Periodic Table changes?

	type of ion	effect on position of element Y in Periodic Table
<b>A</b>	negative	moves one place to the right
<b>B</b>	negative	no change
<b>C</b>	positive	moves one place to the right
<b>D</b>	positive	no change

16 An aqueous solution of a compound of metal M is tested.

- It does not give a characteristic flame colour.
- It forms a precipitate with aqueous ammonia; the precipitate is soluble in excess ammonia.

What is metal M?

- A** copper
- B** iron
- C** potassium
- D** zinc

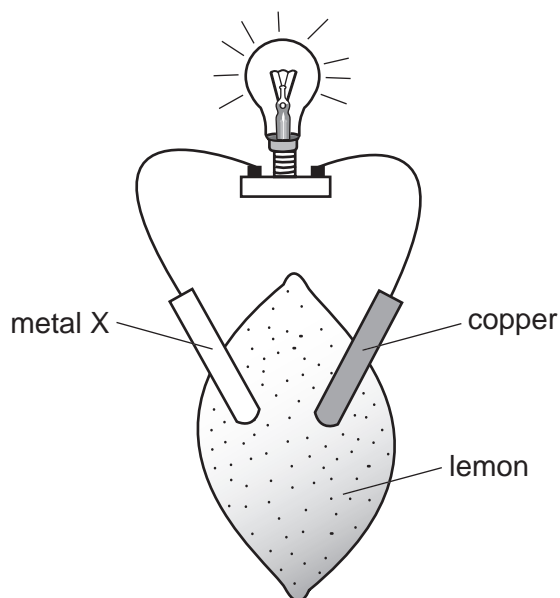
17 Nitrogen oxides are formed when car engines burn fossil fuels.

Which row shows why nitrogen oxides are unwanted products?

	acidic	pollutant
<b>A</b>	no	no
<b>B</b>	no	yes
<b>C</b>	yes	no
<b>D</b>	yes	yes



18 The diagram shows an experiment using a lemon.



Which statements are correct?

	lemon juice is an electrolyte	X could be copper	X could be zinc
<b>A</b>	✓	✓	✓
<b>B</b>	✓	✓	✗
<b>C</b>	✓	✗	✓
<b>D</b>	✗	✓	✓

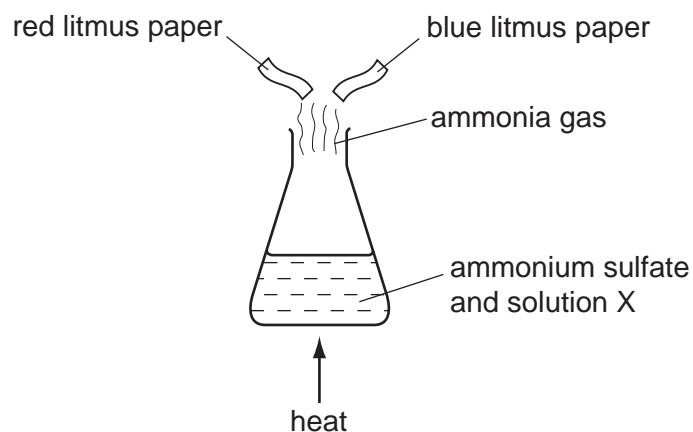
19 Chlorophyll is extracted from green plants.

Which method should be used to separate chlorophyll from other coloured substances?

- A** chromatography
- B** cracking
- C** distillation
- D** neutralisation

20 Ammonium sulfate is heated with solution X and ammonia gas is given off.

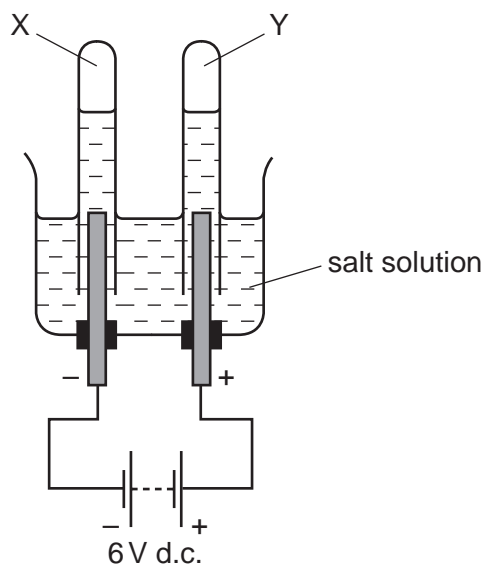
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas.



What is solution X and what will be the colour change of the litmus paper?

	solution X	colour change of litmus paper
<b>A</b>	hydrochloric acid	blue to red
<b>B</b>	hydrochloric acid	red to blue
<b>C</b>	sodium hydroxide	blue to red
<b>D</b>	sodium hydroxide	red to blue

21 When concentrated salt solution is electrolysed, two gases X and Y are formed.



One of the gases explodes when tested with a burning splint and the other turns moist Universal Indicator paper red then white.

What are X and Y?

	X	Y
<b>A</b>	chlorine	hydrogen
<b>B</b>	hydrogen	chlorine
<b>C</b>	hydrogen	oxygen
<b>D</b>	oxygen	chlorine

22 The contents of a beaker scatter a beam of light.

What does the beaker contain?

- A** aqueous copper(II) sulfate
- B** ethanol
- C** milk
- D** water

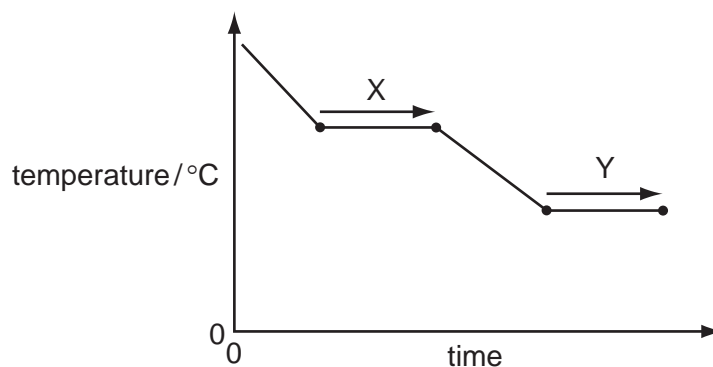
23 The table shows the name and formula of four metal ores.

	name	formula
1	chalcopyrite	$\text{CuFeS}_2$
2	ilmenite	$\text{FeTiO}_3$
3	malachite	$\text{Cu}_2\text{CO}_3(\text{OH})_2$
4	wolframite	$\text{FeWO}_4$

Which metal ores contain two different metals?

- A 1 and 3 only
  - B 2 and 4 only
  - C 1, 2 and 4 only
  - D 2, 3 and 4 only
- 24 Which property of an element suggests that it is a metal?
- A It conducts electricity.
  - B It forms covalent compounds.
  - C It has a low density.
  - D It has a low melting point.
- 25 What is an important use of the diesel fraction obtained from crude oil?
- A fuel for lorries and buses
  - B lubricant for door hinges
  - C propellant gas for spray cans
  - D wax for waterproofing car bodies

26 The graph shows the changes in temperature when a substance is cooled.



Which row in the table describes X and Y?

	X	Y
<b>A</b>	boiling	freezing
<b>B</b>	boiling	melting
<b>C</b>	condensing	freezing
<b>D</b>	condensing	melting

27 Which material is combined with a metal oxide to make glass?

- A** carbon
- B** carbon dioxide
- C** silicon
- D** silicon(IV) oxide

28 The table gives four pairs of values of force and the surface area on which the force acts.

Which pair of values gives the largest pressure on the surface?

	force / N	area / m <sup>2</sup>
<b>A</b>	20	2
<b>B</b>	40	2
<b>C</b>	20	4
<b>D</b>	40	4

29 Which is the correct equation for resistance?

- A resistance = current  $\div$  voltage
- B resistance = power  $\div$  current
- C resistance = power  $\div$  voltage
- D resistance = voltage  $\div$  current

30 The winner of a 1500 m race takes 4 minutes to run the race.

What is his average speed in m/s?

- A  $1500 \times \frac{60}{4}$
- B  $1500 \times 4 \times 60$
- C  $\frac{1500}{4 \times 60}$
- D  $\frac{1500 \times 4}{60}$

31 A sample of radioactive material has a mass of 64 mg and a half-life of 16 years.

What is the time taken for the mass of the sample to decrease to 8 mg?

- A 2 years
- B 4 years
- C 48 years
- D 128 years

32 A magnet and a charged plastic rod are held near each other.



magnet

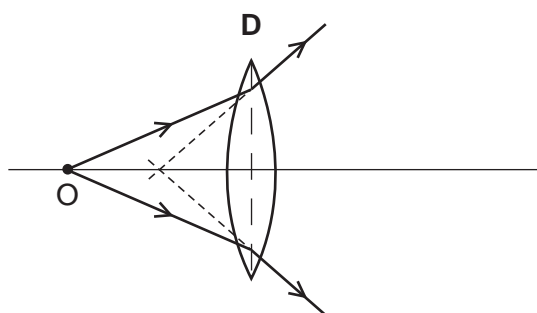
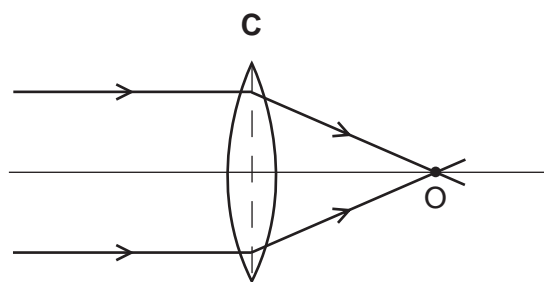
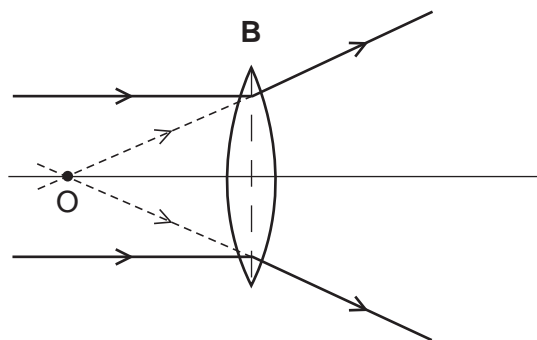
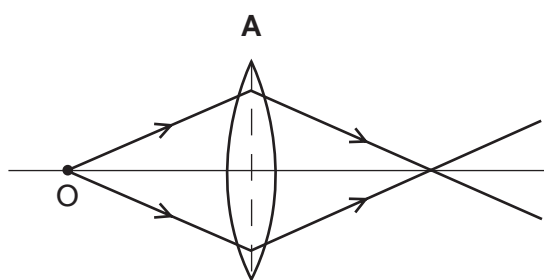


charged plastic rod

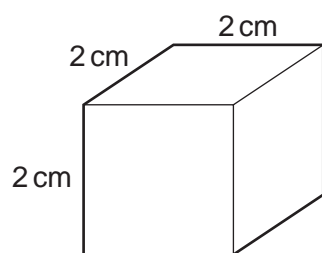
What happens?

- A Both poles of the magnet attract both ends of the plastic rod.
- B Neither pole of the magnet attracts either end of the plastic rod.
- C Only the north pole of the magnet attracts the positive end of the plastic rod.
- D Only the south pole of the magnet attracts the positive end of the plastic rod.

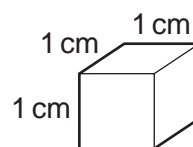
33 Which ray diagram shows a converging lens producing a real image of object O?



34 The cubes shown are made of different materials, but they have the same mass.



material X



material Y

The density of material X is  $1 \text{ g/cm}^3$ .

What is the density of material Y?

- A**  $\frac{1}{8} \text{ g/cm}^3$       **B**  $\frac{1}{2} \text{ g/cm}^3$       **C**  $2 \text{ g/cm}^3$       **D**  $8 \text{ g/cm}^3$

35 A rod is acted upon by two forces as shown in the diagram.

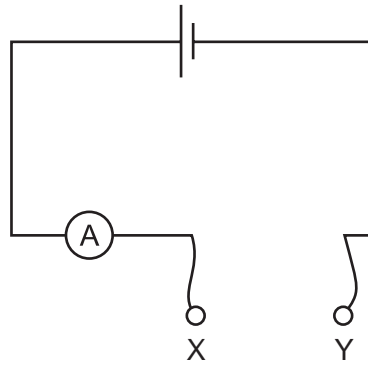


Which effect will be produced by these two forces?

- A both rotation and movement in a straight line
  - B rotation only
  - C no effect, because the forces are balanced
  - D movement in a straight line only
- 36 Liquid X has a higher specific heat capacity than liquid Y.
- What does this mean?
- A 1 kg of liquid X needs to be given more energy than 1 kg of liquid Y to make it evaporate.
  - B 1 kg of liquid X releases more energy than 1 kg of liquid Y when it freezes.
  - C More energy needs to be supplied to 1 kg of liquid X than to 1 kg of liquid Y for their temperatures to rise by the same amount.
  - D The temperature of 1 kg of liquid X rises more than the temperature of 1 kg of liquid Y when they are given the same amount of energy.



- 37 A student has four pieces of resistance wire made of the same material. Each piece is connected in turn between the terminals X and Y in the circuit.



In which wire will the current be the smallest?

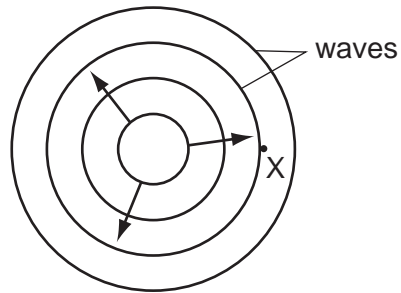
	length / m	diameter / mm
<b>A</b>	0.5	0.5
<b>B</b>	0.5	1.0
<b>C</b>	1.0	0.5
<b>D</b>	1.0	1.0

- 38 A householder asks an electrician to install a mains electrical socket in her bathroom so that she may use a hairdryer there. The electrician refuses to do this because it would be dangerous.

Why would installing the socket be dangerous?

- A** The current drawn by the hairdryer would cause overheating in the cables.
- B** The handling of electrical equipment in damp conditions could cause an electric shock.
- C** The hot air produced by the hairdryer would cause the fuse to melt.
- D** The temperature in the bathroom would damage the insulation.

- 39 A stone is thrown into a pool and waves spread out from where it hits the water.



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

- A the amplitude
  - B the frequency
  - C the wavelength
  - D the wave speed
- 40 Which statement about radioactive emissions is correct?
- A Alpha-particles are the least penetrating and are positively charged.
  - B Alpha-particles are the most penetrating and are positively charged.
  - C Gamma-rays are the least penetrating and are positively charged.
  - D Gamma-rays are the most penetrating and are positively charged.



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

		Group															
		I	II	III	IV	V	VI	VII	0								
		1 <b>H</b> Hydrogen 1															
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4																
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12																
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	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	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <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	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	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	222 <b>Rn</b> Radon 86	
87 <b>Fr</b> Francium	226 <b>Ra</b> Radium	227 <b>Ac</b> Actinium															
		* 58-71 Lanthanoid series † 90-103 Actinoid series															
		140 <b>Ce</b> Cerium 58															
		141 <b>Pr</b> Praseodymium 59															
		144 <b>Nd</b> Neodymium 60															
		150 <b>Sm</b> Samarium 62															
		152 <b>Eu</b> Europium 63															
		157 <b>Gd</b> Gadolinium 64															
		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															
		91 <b>Pa</b> Protactinium															
		93 <b>Np</b> Neptunium															
		94 <b>Pu</b> Plutonium															
		95 <b>Am</b> Americium															
		96 <b>Cm</b> Curium															
		97 <b>Bk</b> Berkelium															
		98 <b>Cf</b> Californium															
		99 <b>Es</b> Einsteinium															
		100 <b>Fm</b> Fermium															
		101 <b>Md</b> Mendelevium															
		102 <b>No</b> Nobelium															
		103 <b>Lr</b> Lawrencium															

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

**Key**

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

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