



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/01

Paper 1 Multiple Choice

October/November 2007

45 minutes

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

* 2 5 2 8 8 4 5 2 2 0 *

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.

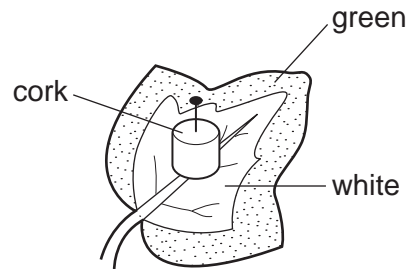
This document consists of **18** printed pages and **2** blank pages.



1 Which feature is characteristic only of birds?

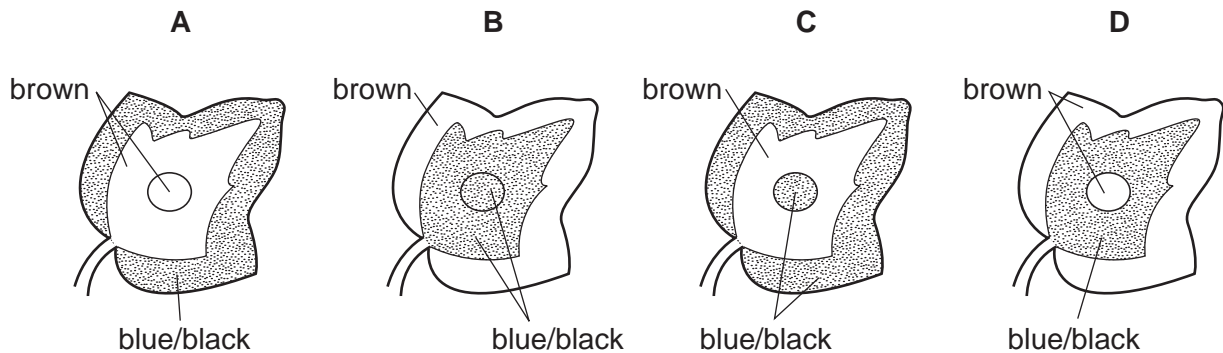
- A feathers and scales
- B fins and hard-shelled eggs
- C hair and scales
- D skin and soft-shelled eggs

2 The diagram shows a cork pinned to a leaf of a plant which is then exposed to light for 8 hours.



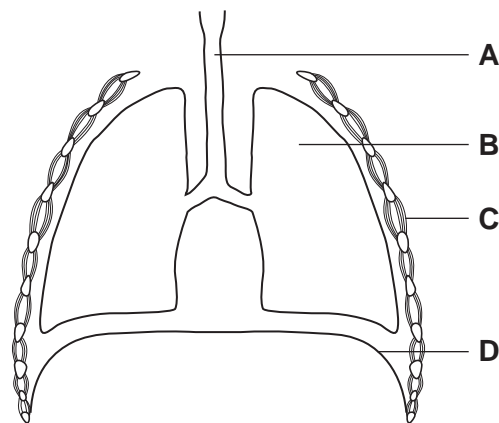
The leaf is then removed from the plant and a starch test carried out on it.

Which diagram shows the result of this starch test?



3 The diagram shows a section through the human thorax.

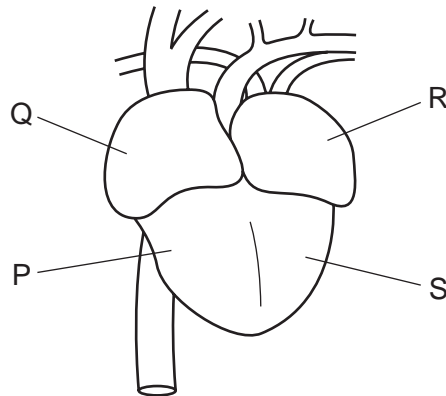
Which structure contains goblet cells and cilia?



4 Which structures make up the nervous system?

- A brain, nerves, spinal cord
- B effectors, impulses, spinal cord
- C impulses, muscles, nerves
- D effectors, receptors, stimuli

5 The diagram shows a human heart, seen from the front.



Which shows the sequence in which a blood cell passes through the four chambers of the heart?

- A $P \rightarrow S \rightarrow R \rightarrow Q$
 - B $Q \rightarrow P \rightarrow R \rightarrow S$
 - C $R \rightarrow Q \rightarrow P \rightarrow S$
 - D $S \rightarrow R \rightarrow Q \rightarrow P$
- 6 Which process in living organisms does **not** use energy from respiration?
- A growth
 - B movement
 - C photosynthesis
 - D temperature maintenance

7 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

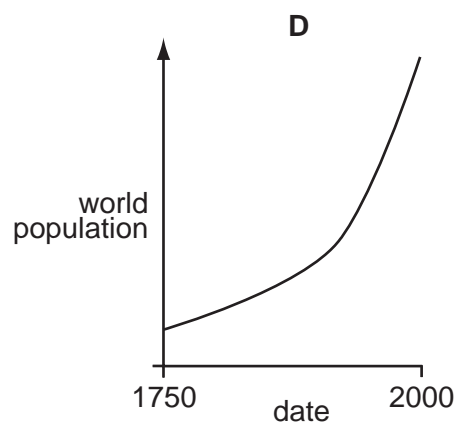
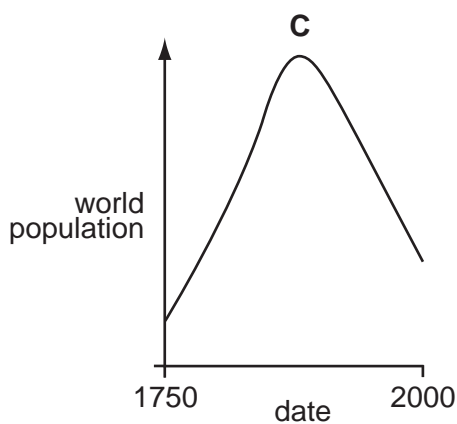
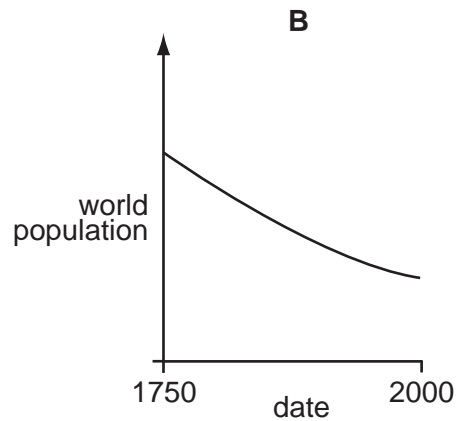
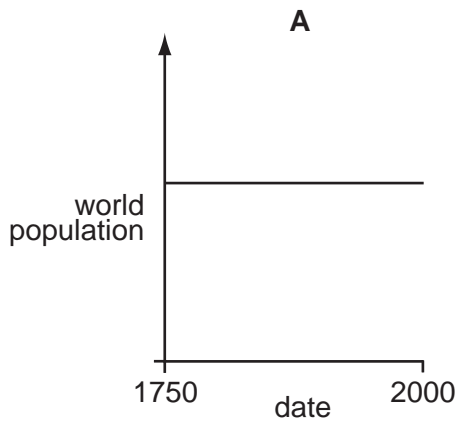
8 What is a cause and a symptom of scurvy?

	cause	symptom
A	lack of vitamin C	bleeding gums
B	lack of vitamin C	soft bones and teeth
C	lack of vitamin D	bleeding gums
D	lack of vitamin D	soft bones and teeth

9 What is most likely to happen if a diet contains excess proteins?

- A** Bacteria will form acids in the mouth.
- B** More amylase will be secreted by the pancreas.
- C** More fibre will be removed through the anus.
- D** More urea will be excreted by the kidneys.

10 Which graph shows the change in world population between 1750 and 2000?



11 In human reproduction, where does fertilisation usually take place?

- A** ovary
- B** oviduct
- C** uterus
- D** vagina

12 Which shows the number of chromosomes in an organism and in its male and female gametes?

	organism	male gamete	female gamete
A	14	7	7
B	16	32	16
C	19	17	36
D	46	22	22

13 What can lead to global warming?

	nitrogen fixation	deforestation	denitrification	burning of fossil fuels
A	✓	✓	✓	x
B	x	x	✓	✓
C	✓	x	✓	x
D	x	✓	x	✓

14 The proton number of element X is 44. Its nucleon number is 145.

How many neutrons are there in an atom of X?

- A** 44 **B** 101 **C** 145 **D** 189

15 An atom has 2 electrons in its outer shell.

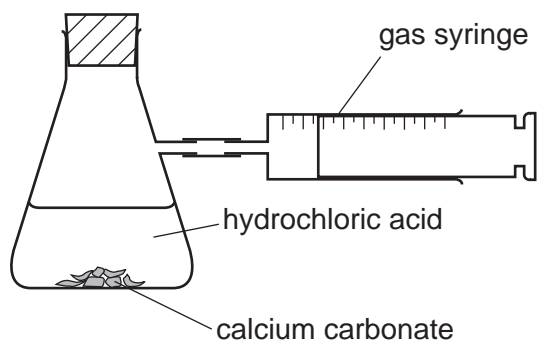
Which element could this atom be?

	Ca	He
A	✓	✓
B	✓	x
C	x	✓
D	x	x

16 Which material is made from silicon(IV) oxide combined with metal oxides?

- A** brass
B glass
C polythene
D steel

- 17 The apparatus shown is used to investigate the speed of reaction between hydrochloric acid and calcium carbonate.



The time to collect 50 cm^3 of gas is measured. Using concentrated acid and lumps of calcium carbonate, the time is 150 s.

In a second experiment, the time is 90 s.

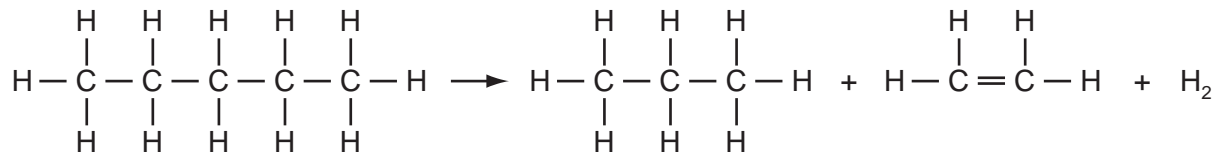
Which change was made in the second experiment?

- A larger lumps of calcium carbonate
 - B less concentrated acid
 - C lower temperature
 - D powdered calcium carbonate
- 18 The table shows physical properties of some substances.

Which substance is metal?

	malleability	density	electrical conductivity
A	brittle	high density	high
B	brittle	low density	low
C	malleable	high density	high
D	malleable	low density	low

19 A petrochemical molecule undergoes the chemical change shown.



What is the chemical change?

- A cracking
- B fractional distillation
- C polymerisation
- D reduction

20 Glucose gives a red precipitate when tested with reagent X.

Cellulose, a protein and starch are broken down into their monomers.

Which of these monomers also give a red precipitate when tested with reagent X?

	cellulose	protein	starch
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

21 A reagent in solution is added to a solid sample of a fertiliser. The mixture is warmed and the gas given off changes the colour of damp litmus paper.

The test shows that the fertiliser contains ammonium ions.

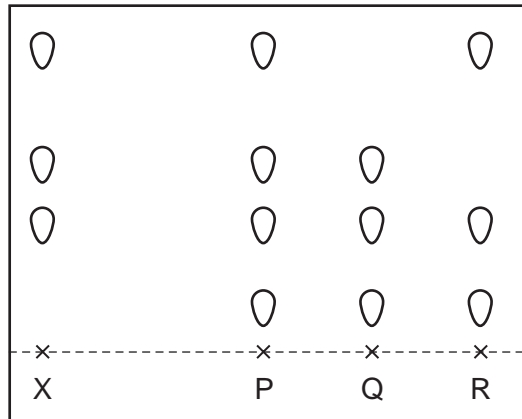
What is the reagent and what is the **original** colour of the litmus paper used in the test?

	reagent	colour of litmus paper
A	acid	blue
B	acid	red
C	alkali	blue
D	alkali	red

22 A plant colour X is a mixture.

Chromatography is used to compare X with three other coloured mixtures, P, Q and R.

The results are shown in the diagram.



Which other mixtures contain the plant colour X?

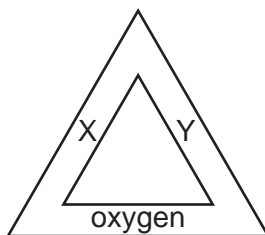
- A P only
- B P and Q only
- C R only
- D P, Q and R

23 The element sulphur forms a colloid with water.

How are the sulphur particles held in the water and how do the particles affect a light beam shone on to the colloid?

	the particles are	the light beam is
A	dissolved	reflected
B	dissolved	scattered
C	suspended	reflected
D	suspended	scattered

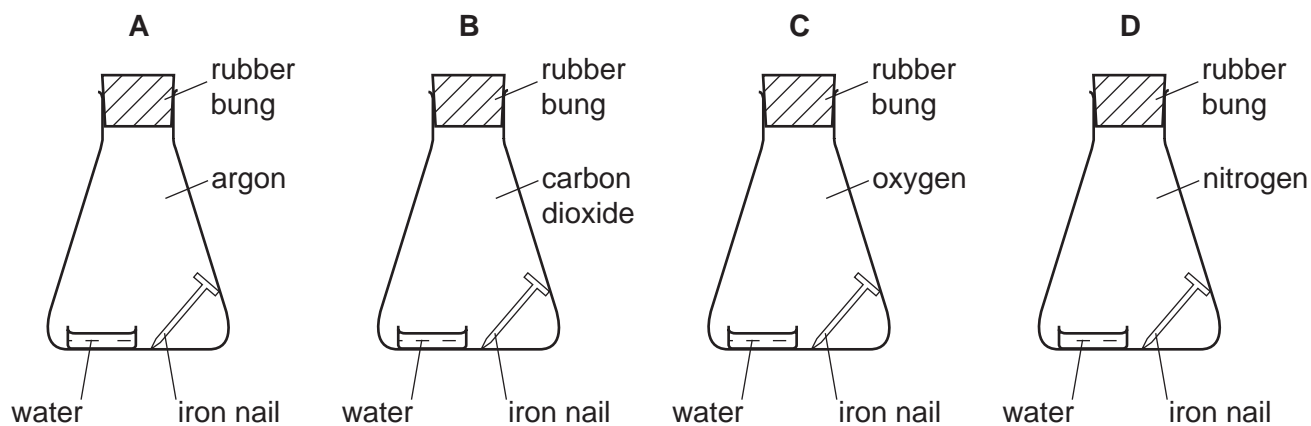
24 The diagram shows a fire triangle.



What are X and Y?

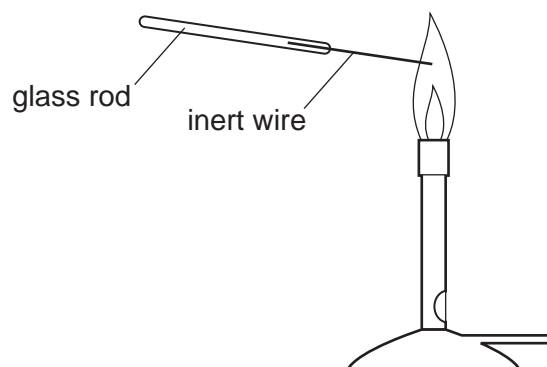
	X	Y
A	air	catalyst
B	air	heat
C	fuel	catalyst
D	fuel	heat

25 In which flask does iron rust?



26 In separate experiments, an inert wire is dipped into two solutions, P and Q.

The wire is then placed in the flame of a Bunsen burner.



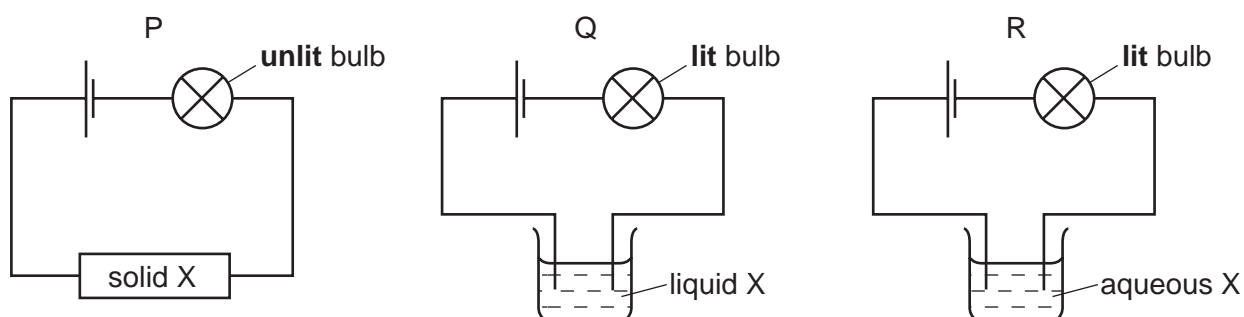
The table shows the results.

	solution P	solution Q
colour of Bunsen flame	green	yellow

Which metal ions are present in the solutions?

	P	Q
A	copper	potassium
B	copper	sodium
C	sodium	copper
D	sodium	potassium

27 Substance X is an ionic compound.

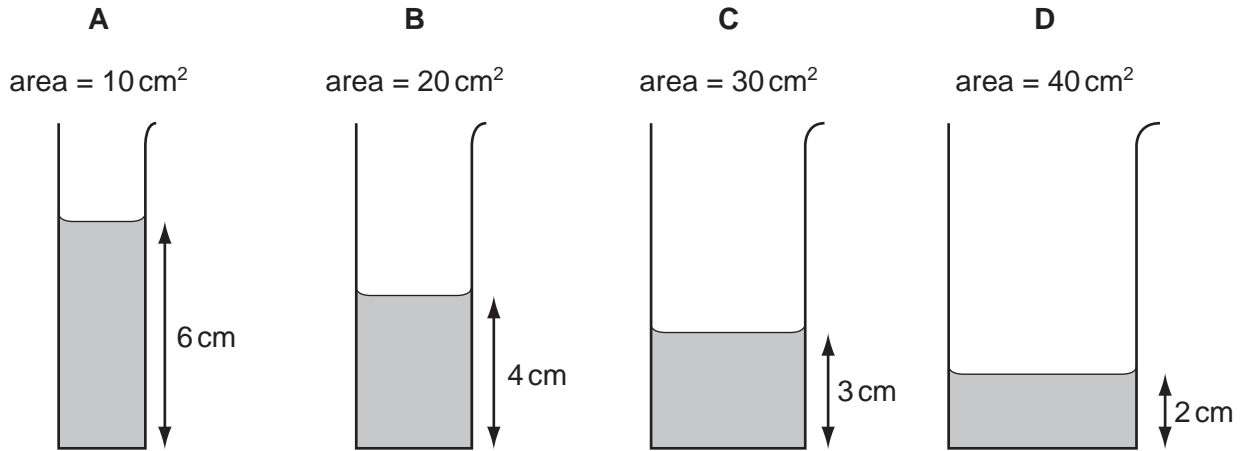


Which diagrams are correct for X?

- A** P and Q only
- B** P and R only
- C** R and Q only
- D** P, Q and R

28 Some water is poured into four tubes of different cross-sectional areas.

Which tube contains the largest volume of water?



29 What are the correct units for force and for weight?

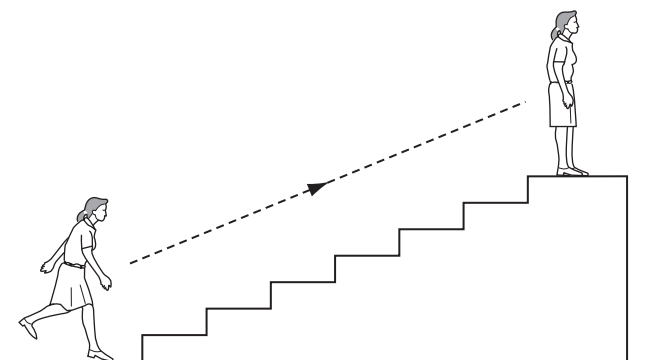
	force	weight
A	kg	kg
B	kg	N
C	N	kg
D	N	N

30 A metal drum has a mass of 200 kg when empty and 1000 kg when filled with 1.0 m^3 of methylated spirit.

What is the density of methylated spirit?

- A** 0.0050 kg/m^3
- B** 0.11 kg/m^3
- C** 800 kg/m^3
- D** 1000 kg/m^3

31 A person uses chemical energy to run up some stairs.



She stops at the top of the stairs.

What has the chemical energy been converted to when she is at the top of the stairs?

- A kinetic energy and gravitational potential energy
- B kinetic energy and nuclear energy
- C gravitational potential energy and heat energy
- D nuclear energy and heat energy

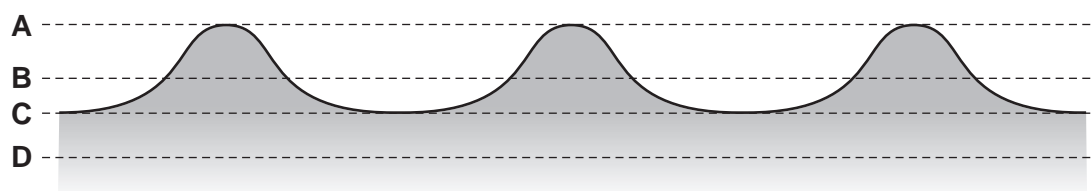
32 Some gas in a sealed plastic bag is cooled.

How do the gas molecules behave when this happens?

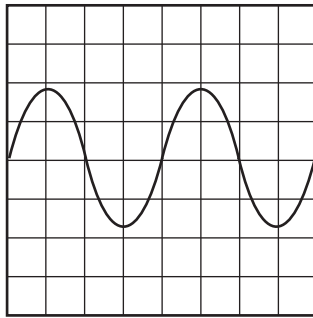
- A They move more quickly and become closer together.
- B They move more quickly and become further apart.
- C They move more slowly and become closer together.
- D They move more slowly and become further apart.

33 The diagram shows a section through a series of waves on water.

Which dotted line shows the position of the still water surface after the waves have passed?



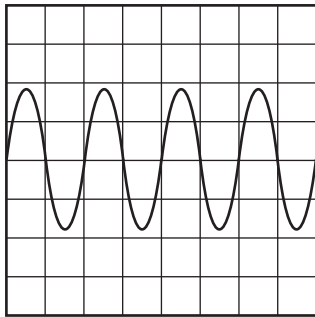
34 The diagram represents a sound wave.



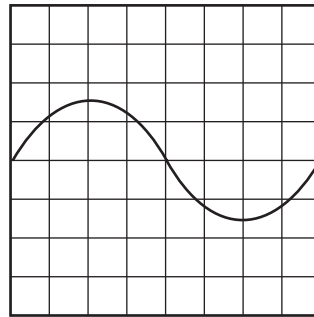
The frequency of the sound is increased.

The diagrams below are shown to the same scale. Which diagram represents the new sound wave?

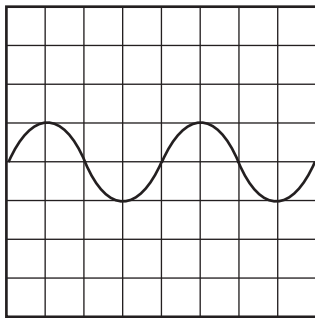
A



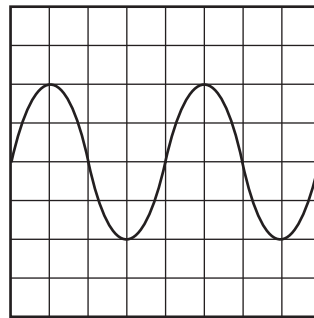
B



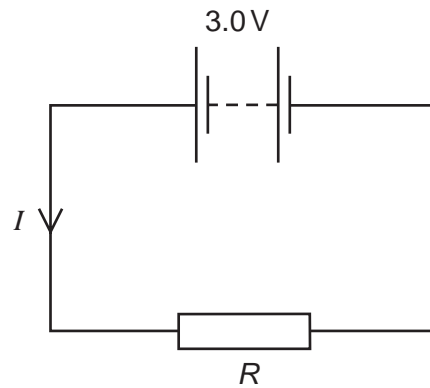
C



D



35 The circuit shows a current I in a resistor of resistance R .



Which line gives possible values of I and R ?

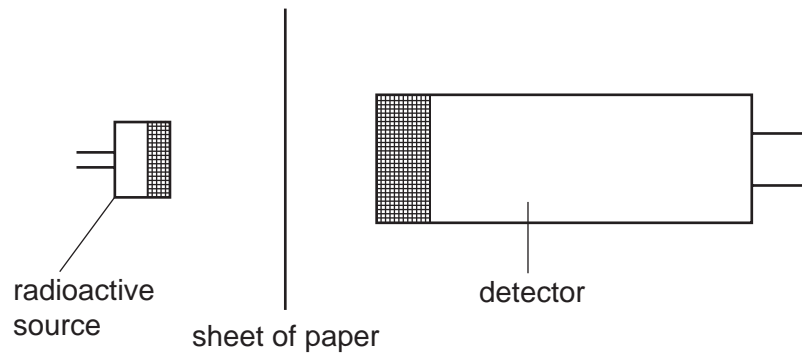
	I/A	R/Ω
A	1.5	1.5
B	1.5	2.0
C	6.0	2.0
D	4.0	12

36 A mains electrical circuit uses insulated copper cable and the cable overheats.

To prevent the cable overheating, how should the cable be changed, and why?

- A** Use thicker copper cable which has less resistance.
- B** Use thicker insulation which stops the heat escaping.
- C** Use thinner copper cable which has more resistance.
- D** Use thinner insulation which allows less heat to escape.

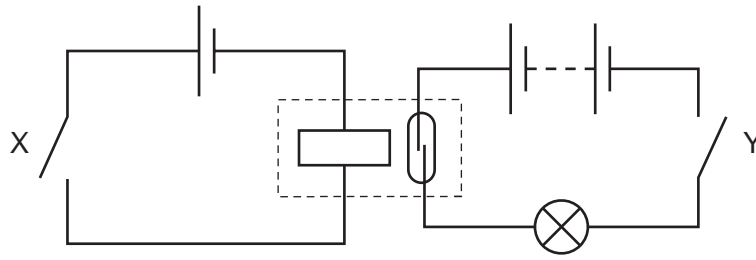
37 A sheet of paper is placed between a radioactive source and a detector.



Which types of radiation can pass through the paper?

- A alpha radiation and beta radiation only
 - B alpha radiation and gamma radiation only
 - C beta radiation and gamma radiation only
 - D alpha radiation, beta radiation and gamma radiation
- 38 Which energy source is **not** renewable?
- A hydroelectric
 - B nuclear
 - C solar
 - D wind
- 39 The output from a power station is connected to the transmission cables through a transformer.
- What is the purpose of the transformer?
- A to change the frequency of the output
 - B to increase the current
 - C to increase the voltage
 - D to turn the current into alternating current

40 The diagram shows the use of a reed relay.



Which switch positions cause the lamp to light?

	X	Y
A	closed	closed
B	closed	open
C	open	closed
D	open	open

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DATA SHEET
The Periodic Table of the Elements

		Group																																																																																																																	
I	II	III	IV	V	VI	VII	O																																																																																																												
7 Li Lithium 3	9 Be Beryllium 4	<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 5%;">1 H Hydrogen 1</td> <td colspan="10"></td> </tr> <tr> <td>11 Na Sodium 11</td> <td>12 Mg Magnesium 12</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> <td>21 Sc Scandium 21</td> <td>22 Ti Titanium 22</td> <td>23 V Vanadium 23</td> <td>24 Cr Chromium 24</td> <td>25 Mn Manganese 25</td> <td>26 Fe Iron 26</td> <td>27 Co Cobalt 27</td> <td>28 Ni Nickel 28</td> <td>29 Cu Copper 29</td> <td>30 Zn Zinc 30</td> <td>31 Ga Gallium 31</td> <td>32 Ge Germanium 32</td> <td>33 As Arsenic 33</td> <td>34 Se Selenium 34</td> <td>35 Br Bromine 35</td> <td>36 Kr Krypton 36</td> <td>37 Rb Rubidium 37</td> <td>38 Sr Strontium 38</td> <td>39 Y Yttrium 39</td> <td>40 Zr Zirconium 40</td> <td>41 Nb Niobium 41</td> <td>42 Mo Molybdenum 42</td> <td>43 Tc Technetium 43</td> <td>44 Ru Ruthenium 44</td> <td>45 Rh Rhodium 45</td> <td>46 Pd Palladium 46</td> <td>47 Ag Silver 47</td> <td>48 Cd Cadmium 48</td> <td>49 In Indium 49</td> <td>50 Sn Tin 50</td> <td>51 Sb Antimony 51</td> <td>52 Te Tellurium 52</td> <td>53 I Iodine 53</td> <td>54 Xe Xenon 54</td> <td>55 Cs Caesium 55</td> <td>56 Ba Barium 56</td> <td>57 La Lanthanum 57</td> <td>58 Ce Cerium 58</td> <td>59 Pr Praseodymium 59</td> <td>60 Nd Neodymium 60</td> <td>61 Pm Promethium 61</td> <td>62 Sm Samarium 62</td> <td>63 Eu Europium 63</td> <td>64 Gd Gadolinium 64</td> <td>65 Tb Terbium 65</td> <td>66 Dy Dysprosium 66</td> <td>67 Ho Holmium 67</td> <td>68 Er Erbium 68</td> <td>69 Tm Thulium 69</td> <td>70 Yb Ytterbium 70</td> <td>71 Lu Lutetium 71</td> <td>72 Hf Hafnium 72</td> <td>73 Ta Tantalum 73</td> <td>74 W Tungsten 74</td> <td>75 Re Rhenium 75</td> <td>76 Os Osmium 76</td> <td>77 Ir Iridium 77</td> <td>78 Pt Platinum 78</td> <td>79 Au Gold 79</td> <td>80 Hg Mercury 80</td> <td>81 Tl Thallium 81</td> <td>82 Pb Lead 82</td> <td>83 Bi Bismuth 83</td> <td>84 Po Polonium 84</td> <td>85 At Astatine 85</td> <td>86 Rn Radon 86</td> <td>87 Fr Francium 87</td> <td>88 Ra Radium 88</td> <td>89 Ac Actinium 89</td> <td>90 Th Thorium 90</td> <td>91 Pa Protactinium 91</td> <td>92 U Uranium 92</td> <td>93 Np Neptunium 93</td> <td>94 Pu Plutonium 94</td> <td>95 Am Americium 95</td> <td>96 Cm Curium 96</td> <td>97 Bk Berkelium 97</td> <td>98 Cf Californium 98</td> <td>99 Es Einsteinium 99</td> <td>100 Fm Fermium 100</td> <td>101 Md Mendelevium 101</td> <td>102 No Nobelium 102</td> <td>103 Lr Lawrencium 103</td> </tr> </table>										1 H Hydrogen 1											11 Na Sodium 11	12 Mg Magnesium 12	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	21 Sc Scandium 21	22 Ti Titanium 22	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 Ga Gallium 31	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Zr Zirconium 40	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Sn Tin 50	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	55 Cs Caesium 55	56 Ba Barium 56	57 La Lanthanum 57	58 Ce Cerium 58	59 Pr Praseodymium 59	60 Nd Neodymium 60	61 Pm Promethium 61	62 Sm Samarium 62	63 Eu Europium 63	64 Gd Gadolinium 64	65 Tb Terbium 65	66 Dy Dysprosium 66	67 Ho Holmium 67	68 Er Erbium 68	69 Tm Thulium 69	70 Yb Ytterbium 70	71 Lu Lutetium 71	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103
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| 137 **Cs** Caesium 55 | 138 **Ba** Barium 56 | 139 **La** Lanthanum 57 | 140 **Ce** Cerium 58 | 141 **Pr** Praseodymium 59 | 142 **Nd** Neodymium 60 | 143 **Pm** Promethium 61 | 144 **Nd** Neodymium 60 | 145 **Eu** Europium 63 | 146 **Gd** Gadolinium 64 | 147 **Tb** Terbium 65 | 148 **Dy** Dysprosium 66 | 149 **Ho** Holmium 67 | 150 **Er** Erbium 68 | 151 **Tm** Thulium 69 | 152 **Yb** Ytterbium 70 | 153 **Lu** Lutetium 71 | 154 **Lu** Lutetium 71 | 155 **Lu** Lutetium 71 | 156 **Lu** Lutetium 71 | 157 **Lu** Lutetium 71 | 158 **Lu** Lutetium 71 | 159 **Lu** Lutetium 71 | 160 **Lu** Lutetium 71 | 161 **Lu** Lutetium 71 | 162 **Lu** Lutetium 71 | 163 **Lu** Lutetium 71 | 164 **Lu** Lutetium 71 | 165 **Lu** Lutetium 71 | 166 **Lu** Lutetium 71 | 167 **Lu** Lutetium 71 | 168 **Lu** Lutetium 71 | 169 **Lu** Lutetium 71 | 170 **Lu** Lutetium 71 | 171 **Lu** Lutetium 71 | 172 **Lu** Lutetium 71 | 173 **Lu** Lutetium 71 | 174 **Lu** Lutetium 71 | 175 **Lu** Lutetium 71 |

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a	X	b
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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.).