

CAMBRIDGE INTERNATIONAL EXAMINATIONS
Joint Examination for the School Certificate
and General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE

5130/1

PAPER 1 Multiple Choice

OCTOBER/NOVEMBER SESSION 2002

1 hour

Additional materials:
Multiple Choice answer sheet
Soft clean eraser
Soft pencil (Type B or HB is recommended)

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.

INFORMATION FOR CANDIDATES

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.

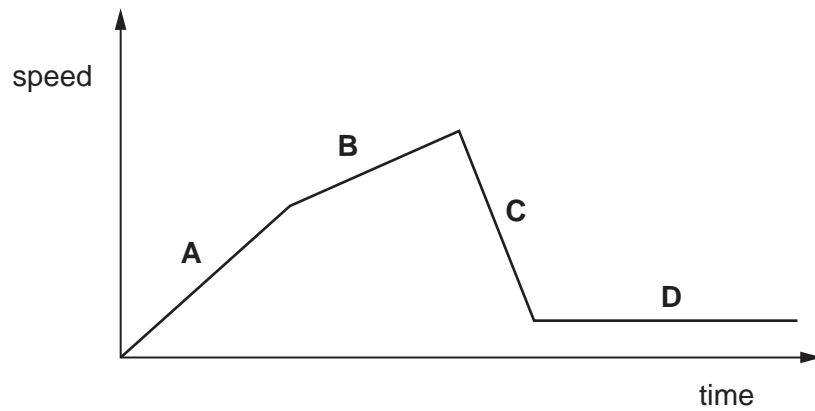
A copy of the Periodic Table is printed on page 16.

This question paper consists of 16 printed pages.

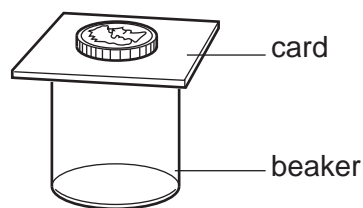


- 1 The speed-time graph for a falling skydiver is shown below. The skydiver alters his fall by spreading his arms and legs and then by using a parachute.

Which part of the graph shows the diver falling with terminal velocity?



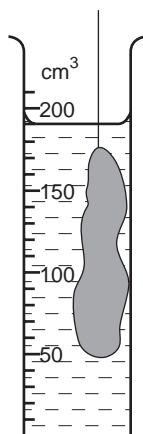
- 2 A coin is placed on top of a beaker, as shown. If the card is pulled away quickly, the coin does not move sideways but falls into the beaker.



Which property of the coin makes this possible?

- A density
- B inertia
- C thickness
- D volume

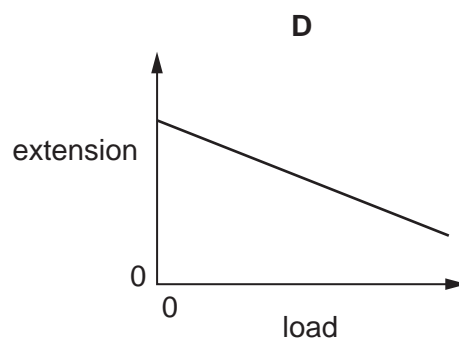
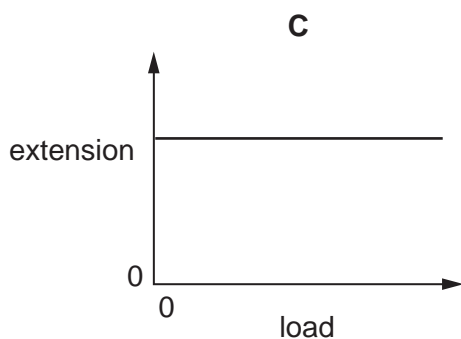
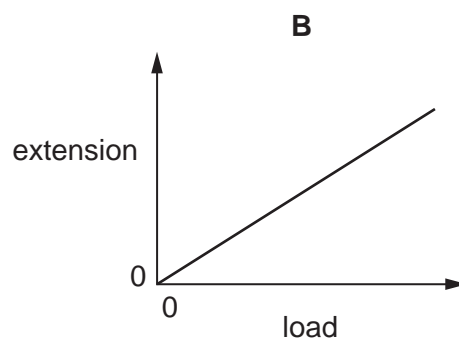
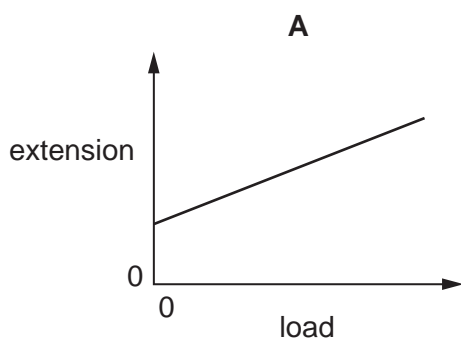
- 3 A body of mass 500 g was suspended in 100 cm³ of water by a piece of cotton as shown.



What is the density of the body?

- A** 0.38 g / cm³ **B** 2.63 g / cm³ **C** 5.00 g / cm³ **D** 5.56 g / cm³
- 4 A student adds different loads to the end of a spring. She finds the extension in each case and plots a graph of extension against load.

Which is the correct graph?



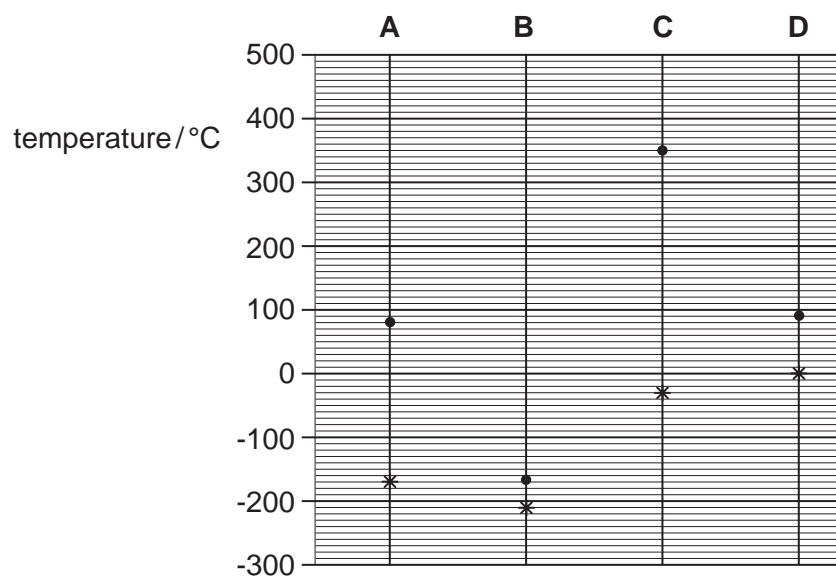
- 5 When a radioactive nucleus decays, a large amount of energy E is released. At the same time, a small amount of mass m is lost.

Which of the following gives the amount of energy E ? (speed of light = c)

- A** mc^2 **B** mc **C** $\frac{1}{2}mc^2$ **D** $\frac{1}{2}mc$

- 6 The diagram shows the melting points and boiling points of four substances.
(* = melting point, • = boiling point.)

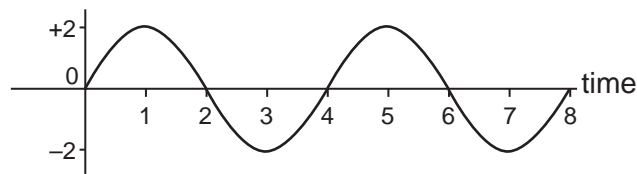
Which substance is a gas at 150°C and a solid at -50°C ?



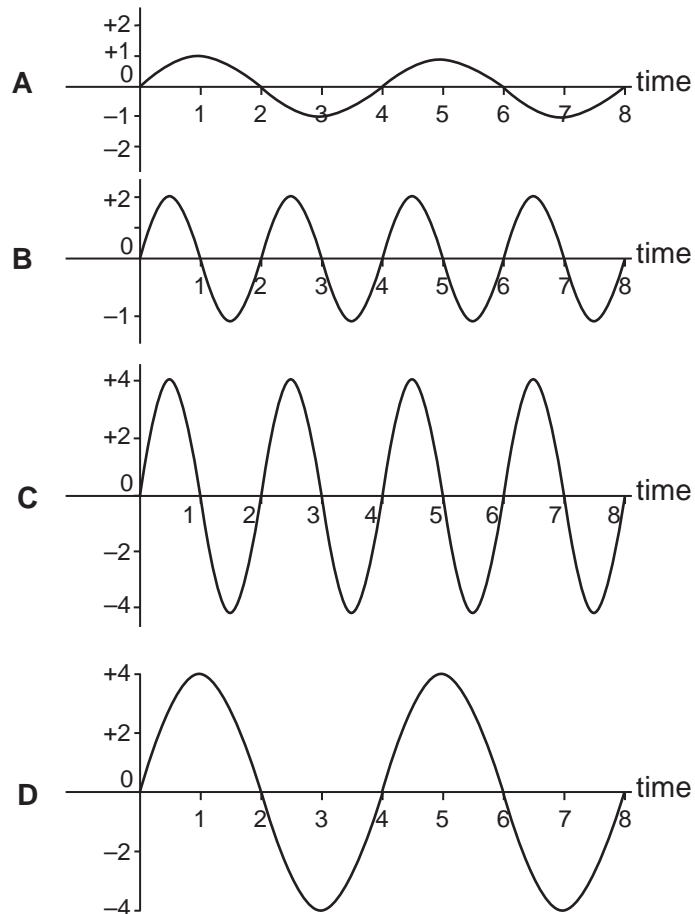
- 7 Which type of wave is longitudinal?

- A** light wave
B radio wave
C sound wave
D surface water wave

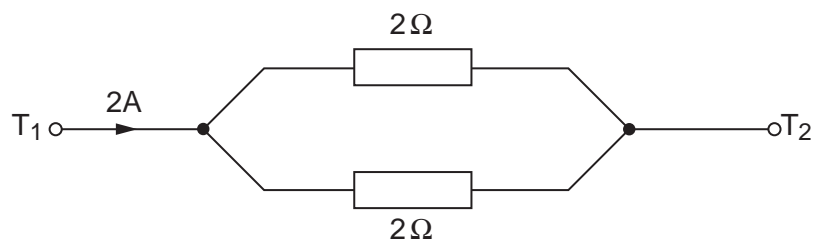
- 8 The diagram shows a displacement / time curve produced by a sound wave of amplitude 2 units.



Which diagram shows the same sound played more loudly?



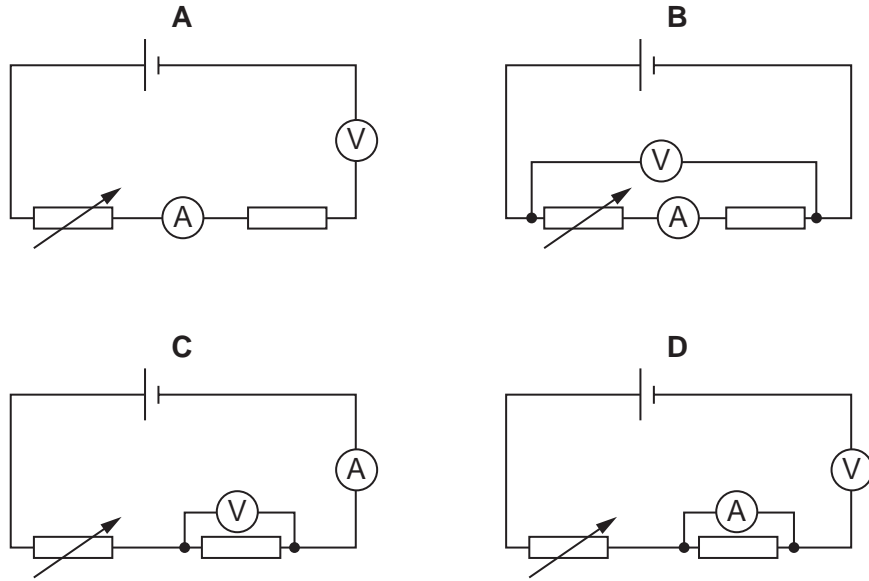
- 9 A total current of 2 A flows between the terminals T_1 and T_2 in the circuit shown.



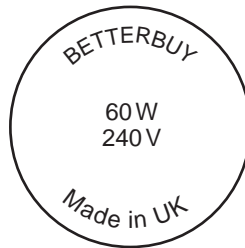
What is the potential difference between T_1 and T_2 ?

- A** 0.5 V **B** 1 V **C** 2 V **D** 4 V

- 10 Which circuit is connected correctly to measure the current flowing through a fixed resistor and the potential difference across the ends of the same resistor?



- 11 The diagram shows some information printed on a light bulb.

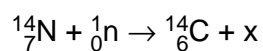


Which current is needed to light the bulb at normal brightness?

- A** 0.25 A **B** 3.0 A **C** 4.0 A **D** 15 A
- 12 Why is a soft iron core placed inside the coil of an electric motor?

- A** to decrease the electric current
B to increase the electric current
C to strengthen the magnetic field
D to weaken the magnetic field

- 13 Carbon-14 is formed when neutrons from nuclei in the atmosphere bombard atmospheric nitrogen.



What does x stand for?

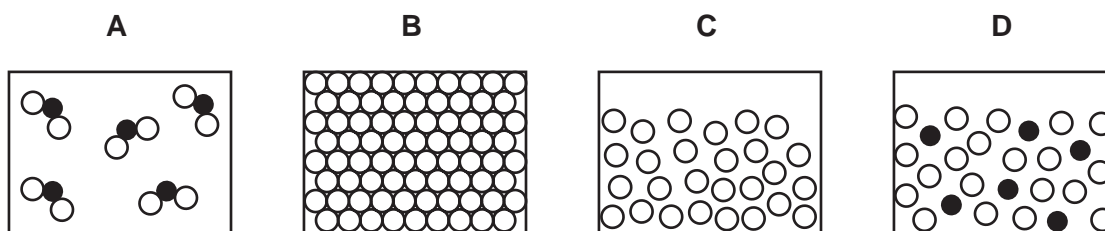
- A** ${}^1_1\text{H}$ **B** ${}^4_2\text{He}$ **C** ${}^0_{-1}\text{e}$ **D** ${}^1_0\text{n}$

14 Which pair of nuclides are isotopes?

- A ${}^{12}_5\text{B}$ and ${}^{12}_6\text{C}$
- B ${}^1_1\text{H}$ and ${}^2_1\text{D}$
- C ${}^{12}_6\text{C}$ and ${}^{13}_7\text{N}$
- D ${}^{14}_6\text{C}$ and ${}^{14}_7\text{N}$

15 The diagrams represent the arrangement of particles in solids, liquids and gases.

Which diagram represents a solution?



16 Which is the best piece of apparatus for transferring accurately 24.7 cm^3 of a solution into a beaker?

- A burette
- B conical flask
- C measuring cylinder
- D pipette

17 An atom of chlorine is represented as ${}^{37}_{17}\text{Cl}$.

What is the total number of neutrons plus protons in the nucleus of this atom?

- A 17
- B 20
- C 37
- D 54

18 Element **Y** has the electronic structure 2,8,2.

Element **Z** has the electronic structure 2,8,6.

The compound formed between **Y** and **Z** will probably

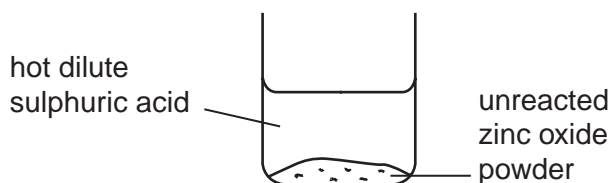
- A conduct electricity when molten.
- B have a low boiling point.
- C have a macromolecular structure.
- D not conduct electricity when dissolved in water.

- 19 When 7 g of iron reacts with 4 g of sulphur, 11 g of iron(II) sulphide is produced.

What will be produced if 7 g of iron is reacted with 7 g of sulphur?

- A 11 g of iron(II) sulphide and 3 g of unchanged iron
- B 11 g of iron(II) sulphide and 3 g of unchanged sulphur
- C 11 g of iron(II) sulphide only
- D 14 g of iron(II) sulphide only

- 20 The diagram shows the first step in the preparation of pure, dry crystals of zinc sulphate.



Other steps are

- 1 evaporation
- 2 filtration
- 3 washing and drying

In which order should these steps be carried out?

- A 1 2 3
- B 1 3 2
- C 2 1 3
- D 2 3 1

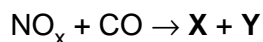
- 21 How many electrons and protons are in an **ion** of an element in Group VI of the Periodic Table?

	number of electrons	number of protons
A	8	6
B	8	8
C	18	16
D	18	20

- 22** Titrating dilute sulphuric acid against aqueous potassium carbonate can be used to prepare potassium sulphate.

Which conclusion can be drawn from this information?

- A** Potassium carbonate is insoluble in water.
 - B** Potassium carbonate neutralises sulphuric acid.
 - C** Potassium sulphate is a base.
 - D** Potassium sulphate is insoluble in water.
- 23** Which of the following oxides is most readily reduced to the metal by heating in a stream of hydrogen?
- A** calcium oxide
 - B** copper(II) oxide
 - C** sodium oxide
 - D** zinc oxide
- 24** In a catalytic converter nitrogen oxides react with carbon monoxide.



What are **X** and **Y**?

- A** carbon dioxide and nitrogen
 - B** carbon dioxide and water
 - C** oxygen and nitrogen
 - D** oxygen and water
- 25** Which electrolysis gives the products as shown in the table?

	electrolyte	electrodes	cathode (–ve)	anode (+ve)
A	aqueous copper(II) sulphate	copper	Cu(s)	Cu ²⁺ (aq)
B	aqueous copper(II) sulphate	carbon	O ₂ (g)	Cu ²⁺ (aq)
C	molten sodium chloride	carbon	H ₂ (g)	Cl ₂ (g)
D	dilute sulphuric acid	platinum	O ₂ (g)	H ₂ (g)

26 What is the general formula of an organic acid?

- A C_nH_{2n+2}
- B $C_nH_{2n+1}CO_2H$
- C $C_nH_{2n}O_n$
- D $C_nH_{2n+1}OH$

27 Compound **X** undergoes an addition reaction with steam.

What is **X**?

- A ethane
- B ethanol
- C ethene
- D methane

28 The table shows some characteristics of four types of cell.

Which cell could be a root hair cell?

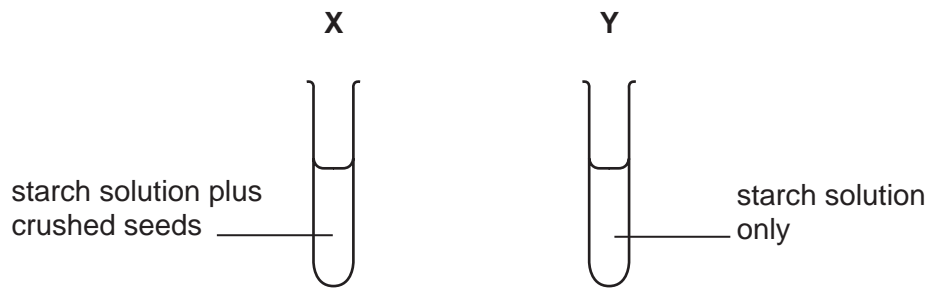
	nucleus	chloroplast
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = present

✗ = absent

- 29** Germinating seeds were crushed with water and added to starch solution in tube **X**. Tube **Y** contained starch solution only.



After 15 minutes, some liquid was removed from each tube and tested for starch. The table shows the results.

tube X	tube Y
no starch	starch present

The remainder of each liquid was then tested for sugar.

Which results were obtained?

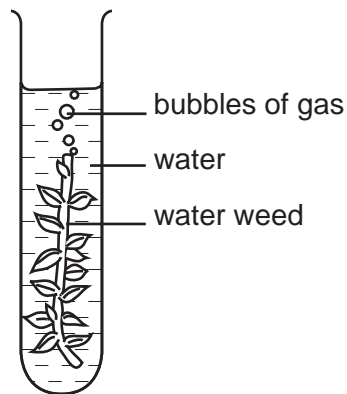
	tube X	tube Y
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = sugar present

✗ = no sugar

30 The diagram shows an experiment set up to investigate photosynthesis.



Which conditions will cause the plant to produce the most bubbles?

	dissolved carbon dioxide	light
A	absent	bright
B	absent	dim
C	present	bright
D	present	dim

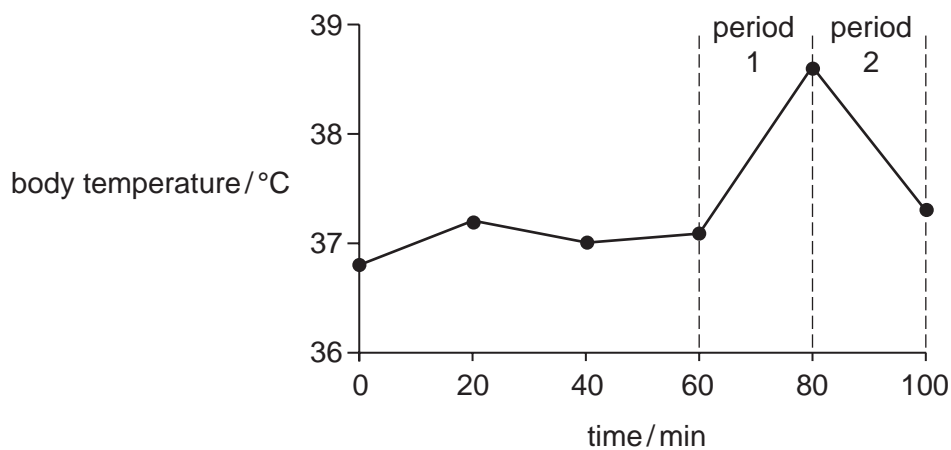
31 What is the function of the gall bladder?

- A** absorption of fat
- B** digestion of fat
- C** production of bile
- D** storage of bile

32 Which path does a molecule of carbon dioxide take as it leaves the body?

- A** alveolus → bronchiole → bronchus → trachea
- B** alveolus → bronchus → bronchiole → trachea
- C** larynx → trachea → bronchus → bronchiole
- D** trachea → larynx → bronchus → bronchiole

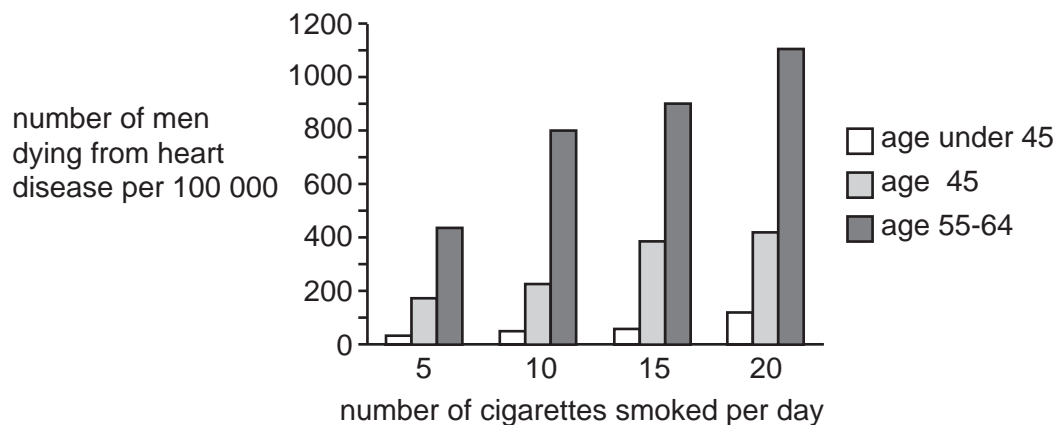
- 33 The graph shows changes in a person's body temperature plotted against time.



What could cause the changes in body temperature in periods 1 and 2?

- | <i>period 1</i> | <i>period 2</i> |
|----------------------------------|---------------------------|
| A reduced air temperature | increased air temperature |
| B reduced air temperature | shivering |
| C vigorous exercise | increased sweating |
| D vigorous exercise | shivering |

- 34 The chart shows the risk of heart disease developing in men who smoke cigarettes.



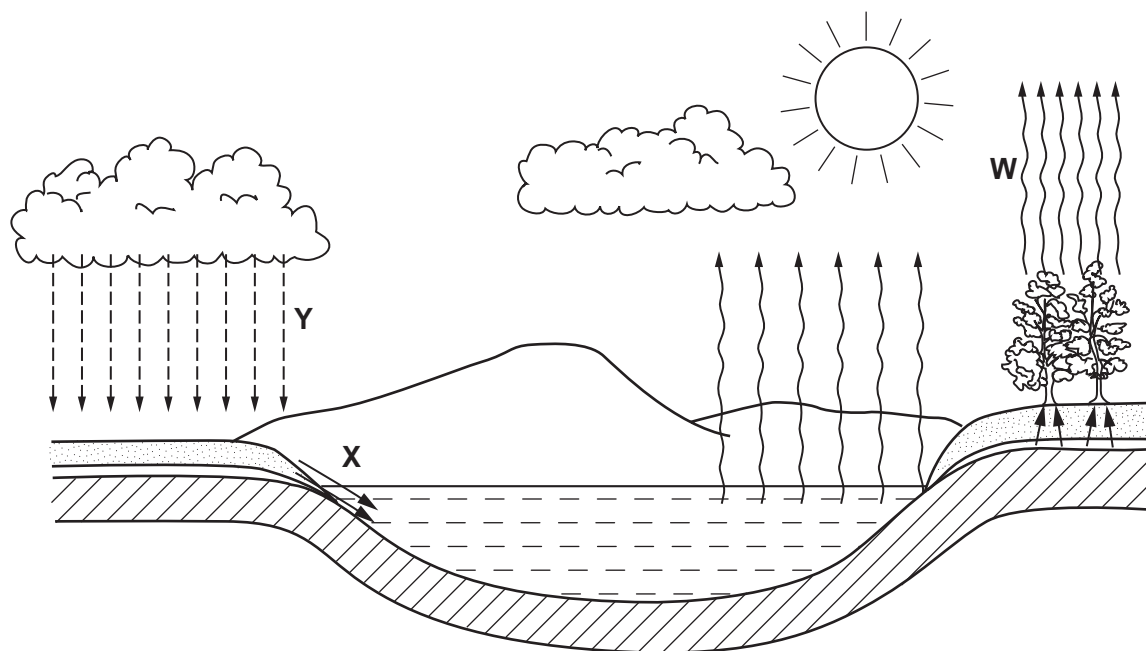
Which group of men is most at risk?

- A** men aged under 45 who smoke 5 cigarettes per day
B men aged under 45 who smoke 20 cigarettes per day
C men aged 55-64 who smoke 5 cigarettes per day
D men aged 55-64 who smoke 20 cigarettes per day

35 What is the main source of energy for green plants?

- A carbon dioxide
- B chlorophyll
- C heat
- D light

36 The diagram shows part of the water cycle.

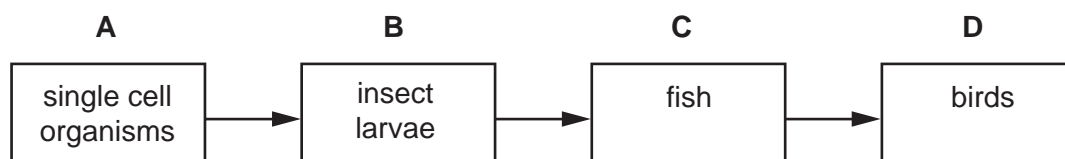


What are processes **W**, **X** and **Y**?

	W	X	Y
A	evaporation	drainage	transpiration
B	evaporation	transpiration	rainfall
C	transpiration	drainage	rainfall
D	transpiration	rainfall	drainage

- 37 The diagram shows a food chain found in a freshwater lake that is polluted by insecticides.

Which organisms in the food chain will accumulate the highest concentration of insecticide in their body tissues?



- 38 Sexual reproduction is a process in which

- A all types of organism reproduce.
- B many cells of one type fuse with a single cell of another type.
- C nuclei of two specialised cells fuse together.
- D parents produce genetically identical offspring.

- 39 Which of the following can cross the placenta?

	fatty acids	urea	red blood cells
A	✓	✓	✗
B	✗	✗	✓
C	✓	✗	✓
D	✗	✓	✗

key

✓ = can cross
the placenta
✗ = cannot cross
the placenta

- 40 A person with Down's syndrome is born with 47 chromosomes in each of their cells, instead of 46.

What could cause this?

- A A mutation occurred during the production of the egg cell.
- B More than one sperm fused with the egg at fertilisation.
- C Radiation caused a change in structure of a gene in the father's sperm.
- D The mother was exposed to harmful chemicals while she was pregnant.

DATA SHEET

Group

I	II																III	IV	V	VI	VII	0										
<div><div><div><div><div><div>1</div><div>H</div><div>Hydrogen</div><div>1</div></div></div><div><div><div>9</div><div>Be</div><div>Beryllium</div><div>4</div></div><div><div>23</div><div>Na</div><div>Sodium</div><div>11</div></div><div><div>39</div><div>K</div><div>Potassium</div><div>19</div></div><div><div>85</div><div>Rb</div><div>Rubidium</div><div>37</div></div><div><div>133</div><div>Cs</div><div>Caesium</div><div>55</div></div><div><div>226</div><div>Ra</div><div>Radium</div><div>88</div></div><div><div>27</div><div>Al</div><div>Aluminium</div><div>13</div></div><div><div>70</div><div>Ga</div><div>Gallium</div><div>31</div></div><div><div>115</div><div>In</div><div>Indium</div><div>49</div></div><div><div>204</div><div>Tl</div><div>Thallium</div><div>81</div></div><div><div>51</div><div>V</div><div>Vanadium</div><div>23</div></div><div><div>93</div><div>Nb</div><div>Niobium</div><div>41</div></div><div><div>181</div><div>Ta</div><div>Tantalum</div><div>73</div></div><div><div>45</div><div>Sc</div><div>Scandium</div><div>21</div></div><div><div>89</div><div>Y</div><div>Yttrium</div><div>39</div></div><div><div>139</div><div>La</div><div>Lanthanum</div><div>57</div></div><div><div>178</div><div>Hf</div><div>Hafnium</div><div>72</div></div><div><div>186</div><div>Re</div><div>Rhenium</div><div>75</div></div><div><div>190</div><div>Os</div><div>Osmium</div><div>76</div></div><div><div>192</div><div>Ir</div><div>Iridium</div><div>77</div></div><div><div>195</div><div>Pt</div><div>Platinum</div><div>78</div></div><div><div>197</div><div>Au</div><div>Gold</div><div>79</div></div><div><div>201</div><div>Hg</div><div>Mercury</div><div>80</div></div><div><div>59</div><div>Co</div><div>Cobalt</div><div>27</div></div><div><div>103</div><div>Rh</div><div>Rhodium</div><div>45</div></div><div><div>106</div><div>Pd</div><div>Palladium</div><div>46</div></div><div><div>108</div><div>Ag</div><div>Silver</div><div>47</div></div><div><div>112</div><div>Cd</div><div>Cadmium</div><div>48</div></div><div><div>115</div><div>In</div><div>Indium</div><div>49</div></div><div><div>122</div><div>Sb</div><div>Antimony</div><div>51</div></div><div><div>127</div><div>I</div><div>Iodine</div><div>53</div></div><div><div>128</div><div>Te</div><div>Tellurium</div><div>52</div></div><div><div>159</div><div>Tb</div><div>Terbium</div><div>65</div></div><div><div>162</div><div>Dy</div><div>Dysprosium</div><div>66</div></div><div><div>165</div><div>Ho</div><div>Holmium</div><div>67</div></div><div><div>167</div><div>Er</div><div>Erbium</div><div>68</div></div><div><div>169</div><div>Tm</div><div>Thulium</div><div>69</div></div><div><div>173</div><div>Yb</div><div>Ytterbium</div><div>70</div></div><div><div>175</div><div>Lu</div><div>Lutetium</div><div>71</div></div><div><div>140</div><div>Ce</div><div>Cerium</div><div>58</div></div><div><div>141</div><div>Pr</div><div>Praseodymium</div><div>59</div></div><div><div>144</div><div>Nd</div><div>Neodymium</div><div>60</div></div><div><div>150</div><div>Sm</div><div>Samarium</div><div>62</div></div><div><div>152</div><div>Eu</div><div>Europium</div><div>63</div></div><div><div>157</div><div>Gd</div><div>Gadolinium</div><div>64</div></div><div><div>159</div><div>Tb</div><div>Terbium</div><div>65</div></div><div><div>162</div><div>Dy</div><div>Dysprosium</div><div>66</div></div><div><div>165</div><div>Ho</div><div>Holmium</div><div>67</div></div><div><div>167</div><div>Er</div><div>Erbium</div><div>68</div></div><div><div>169</div><div>Tm</div><div>Thulium</div><div>69</div></div><div><div>173</div><div>Yb</div><div>Ytterbium</div><div>70</div></div><div><div>175</div><div>Lu</div><div>Lutetium</div><div>71</div></div><div><div>232</div><div>Th</div><div>Thorium</div><div>90</div></div><div><div>238</div><div>U</div><div>Uranium</div><div>92</div></div><div><div>239</div><div>Pa</div><div>Protactinium</div><div>91</div></div><div><div>244</div><div>Am</div><div>Americium</div><div>95</div></div><div><div>247</div><div>Cm</div><div>Curium</div><div>96</div></div><div><div>254</div><div>Bk</div><div>Berkelium</div><div>97</div></div><div><div>261</div><div>Cf</div><div>Californium</div><div>98</div></div><div><div>267</div><div>Es</div><div>Einsteinium</div><div>99</div></div><div><div>271</div><div>Fm</div><div>Fermium</div><div>100</div></div><div><div>277</div><div>Md</div><div>Mendelevium</div><div>101</div></div><div><div>285</div><div>No</div><div>Nobelium</div><div>102</div></div><div><div>289</div><div>Lr</div><div>Lawrencium</div><div>103</div></div></div></div></div></div>																			4													2
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77	78	79	80	81	82	83	84	85	86	87	88	89	†																			
*58-71 Lanthanoid series †90-103 Actinoid series																																
<div><div><div><div><div><div>a</div><div>X</div><div>b</div></div></div><div>a = relative atomic mass X = atomic symbol b = proton (atomic) number</div></div></div></div>																			4													2
Key																																

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