

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE

5130/01

Paper 1 Multiple Choice

October/November 2006

1 hour

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 16.

This document consists of **16** printed pages.



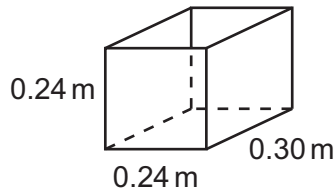
- 1 An object is falling under gravity with terminal velocity.

What can be said about its speed?

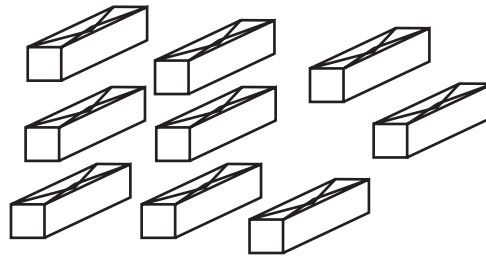
- A It is constant.
- B It is increasing.
- C It is decreasing to zero.
- D It is decreasing to a lower value.

- 2 Nine bags of flour, each of mass 1.5 kg, fill a box.

The box measures 0.30 m × 0.24 m × 0.24 m and has a mass of 0.5 kg.



empty box, mass 0.5 kg



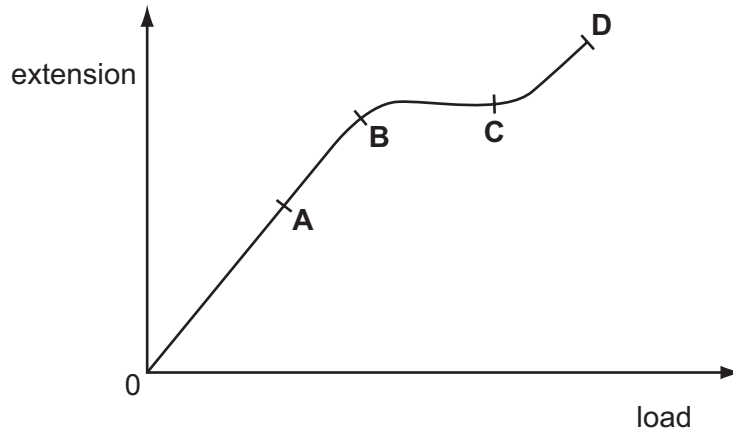
9 × 1.5 kg bags of flour

What is the average density of the full box?

- A $\frac{13.5}{0.30 \times 0.24} \text{ kg/m}^3$
- B $\frac{14}{0.30 \times 0.24} \text{ kg/m}^3$
- C $\frac{13.5}{0.30 \times 0.24 \times 0.24} \text{ kg/m}^3$
- D $\frac{14}{0.30 \times 0.24 \times 0.24} \text{ kg/m}^3$

- 3 The diagram shows an extension-load graph for a material.

Which point represents the limit of proportionality?



- 4 Four students are timed as they run up the same flight of stairs.

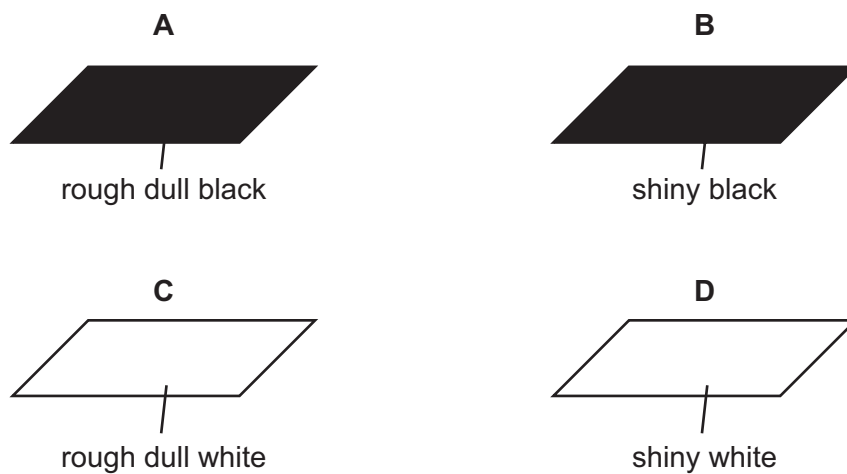
Which student develops the largest power?

	weight of student	time
A	500 N	10 s
B	600 N	12 s
C	700 N	12 s
D	800 N	10 s

- 5 Four identical solar panels are given different coatings on their surfaces.

The panels are placed side by side and exposed to the sun for the same length of time.

Which panel absorbs the **least** radiation?



- 6 A vibrator sends ripples across the surface of water. They run closer together as they travel further from the vibrator.

This shows that the ripples

- A decrease in frequency.
- B increase in frequency.
- C slow down.
- D speed up.

- 7 The diagram represents some of the main parts of the electromagnetic spectrum.

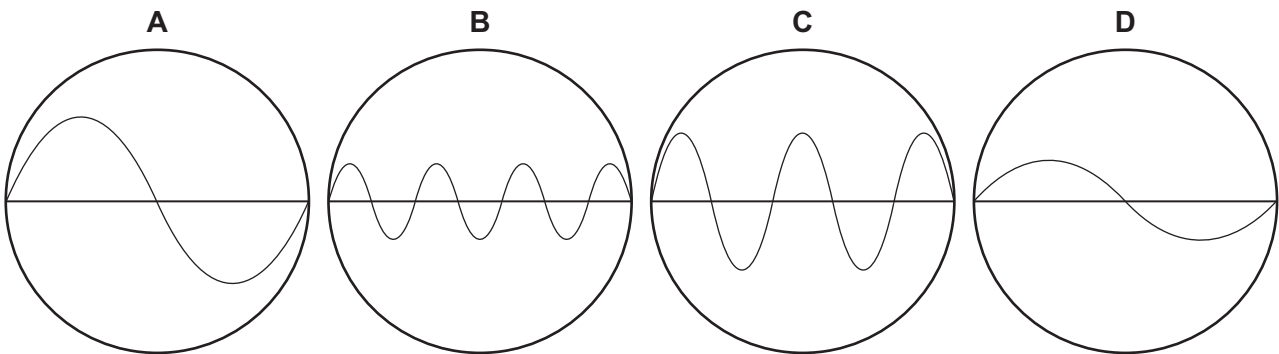
1	infra-red	2	3	4	gamma rays
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What are the numbered parts?

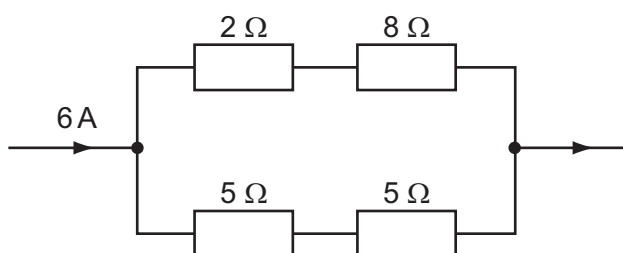
	1	2	3	4
A	radio waves	ultraviolet	visible light	X-rays
B	radio waves	visible light	ultraviolet	X-rays
C	visible light	ultraviolet	X-rays	radio waves
D	visible light	ultraviolet	radio waves	X-rays

- 8 The diagrams represent sound waves displayed on an oscilloscope.

Assuming the controls of the oscilloscope remain the same for each sound, which diagram represents the quietest sound with the highest frequency?

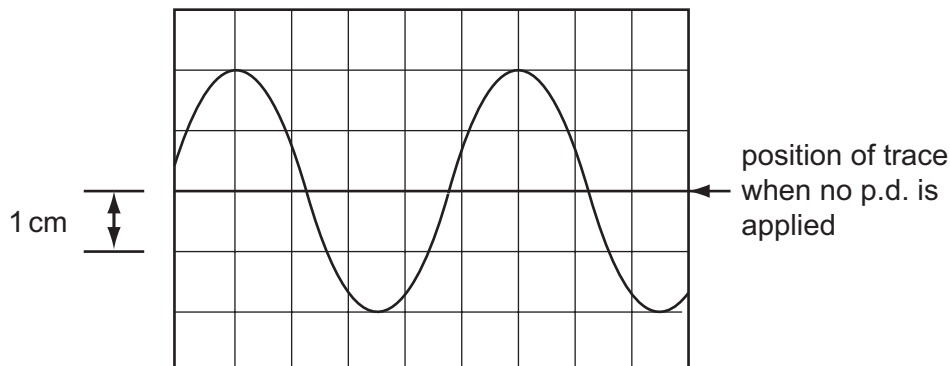


- 9 The diagram shows part of an electric circuit.



What is the current in the $2\ \Omega$ resistor?

- A** $0.6\ \text{A}$ **B** $1.2\ \text{A}$ **C** $3.0\ \text{A}$ **D** $6.0\ \text{A}$
- 10 Which question has to be asked to decide if a material is magnetic or non-magnetic?
- A** Can it affect the direction of a compass needle?
B Can it be given an electric charge?
C Is it a conductor or an insulator?
D Is it a metal or a non-metal?
- 11 The following trace is shown on the screen of an oscilloscope when it is connected to a transformer. The vertical scale is set at $5\ \text{V}$ per centimetre.



What is the value of the peak voltage?

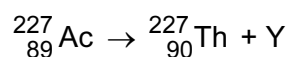
- A** $4\ \text{V}$ **B** $5\ \text{V}$ **C** $10\ \text{V}$ **D** $20\ \text{V}$

- 12 Three nuclei **P**, **Q** and **R** have proton numbers (atomic numbers) and nucleon numbers (mass numbers) as shown.

	proton number	nucleon number
P	43	93
Q	43	94
R	44	94

Which nuclei are isotopes of the same element?

- A** **P** and **Q** only
B **P** and **R** only
C **Q** and **R** only
D **P**, **Q** and **R**
- 13 The equation represents actinium decaying to thorium.



Which particle does Y represent?

- A** a helium nucleus
B a neutron
C an atom
D an electron
- 14 The table shows the results of two tests carried out on separate portions of a solution of salt **X**.

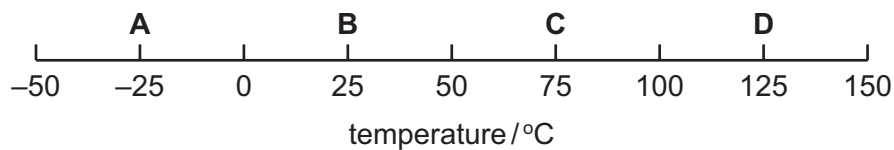
	test	observation
1	acidified aqueous barium nitrate added	white precipitate
2	aqueous sodium hydroxide added	white precipitate soluble in an excess of aqueous sodium hydroxide

What is **X**?

- A** calcium chloride
B iron(II) sulphate
C lead(II) nitrate
D zinc sulphate

- 15 Bromine has a melting point of -2°C and a boiling point of 59°C .

At which temperature is bromine a liquid?



- 16 The table shows the numbers of protons and electrons present in four ions.

Which entry in the table is **not** correct?

	ion	protons	electrons
A	bromide, Br^{-}	35	36
B	iron(II), Fe^{2+}	26	23
C	sodium, Na^{+}	11	10
D	sulphide, S^{2-}	16	18

- 17 A 25 cm^3 sample of dilute sulphuric acid contains 0.025 moles of the acid.

What is the hydrogen ion concentration in the solution?

- A** 0.25 mol/dm^3
B 0.50 mol/dm^3
C 1.00 mol/dm^3
D 2.00 mol/dm^3
- 18 Concentrated aqueous sodium chloride is electrolysed.

Which products are collected at the electrodes?

	cathode	anode
A	hydrogen	chlorine
B	hydrogen	oxygen
C	sodium	chlorine
D	sodium	oxygen

- 19 For an endothermic reaction, the overall energy change is1..... and energy is2..... the surroundings.

Which words correctly complete the sentence?

	1	2
A	negative	given out to
B	negative	taken in from
C	positive	given out to
D	positive	taken in from

- 20 A black powder is burned in air.

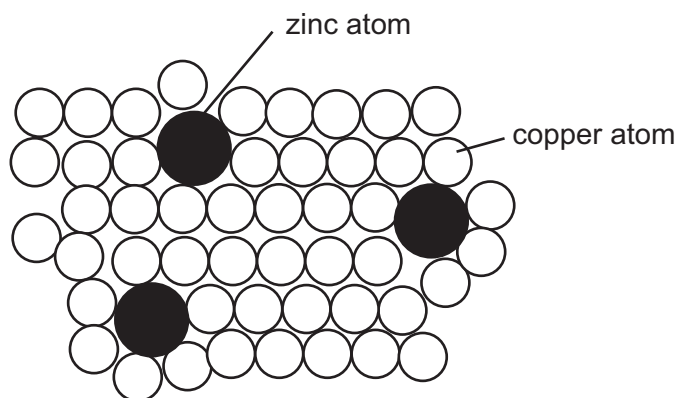
The gas produced dissolves in water to form solution **R**. The pH of **R** is close to 7.

The gas is readily absorbed in aqueous sodium hydroxide.

What type of substance is present in solution **R**?

- A** strong acid
- B** strong base
- C** weak acid
- D** weak base

- 21 The diagram shows the structure of brass.



Why is brass harder than pure copper?

- A** The zinc atoms form strong covalent bonds with copper atoms.
- B** The zinc atoms prevent layers of copper atoms from slipping over each other easily.
- C** The zinc atoms prevent the 'sea of electrons' from moving freely in the solid.
- D** Zinc atoms have more electrons than copper atoms.

22 Chemists have suggested that hydrogen could replace petrol as fuel for car engines.

Which statement best explains this suggestion?

- A Hydrogen can be made cheaply from water.
- B Hydrogen does not form poisonous products when burned.
- C Hydrogen is less dense than all other gases.
- D The combustion of hydrogen is very exothermic.

23 How are the two forms of carbon, graphite and diamond described?

- A allotropes
- B isomers
- C isotopes
- D polymers

24 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 $C_nH_{2n+1}OH$

25 Natural gas contains the compound CH_4 .

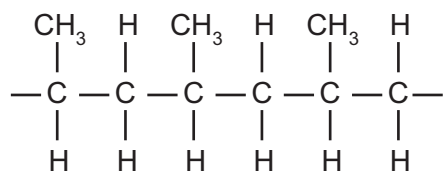
What substances are formed when this compound burns completely?

- A carbon dioxide and hydrogen
- B carbon dioxide and water
- C carbon monoxide and water
- D carbon and water

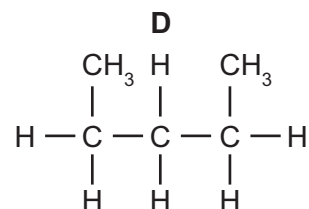
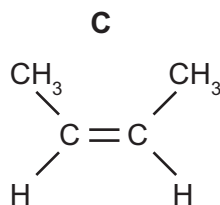
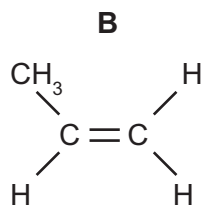
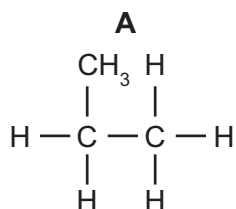
26 Which type of reaction occurs between propene and hydrogen?

- A addition
- B dehydration
- C oxidation
- D substitution

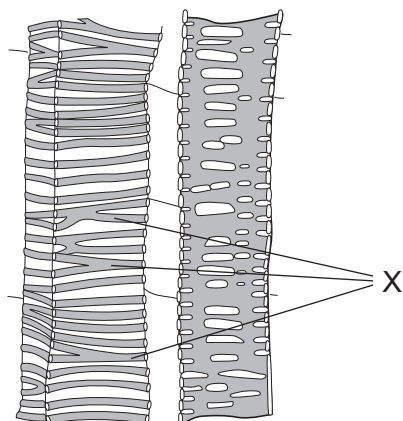
27 The structure of a polymer is shown.



From which hydrocarbon is the polymer made?



28 The diagram shows some xylem cells in longitudinal section.



What is the function of the parts labelled X?

- A** absorption
- B** support
- C** transport of sugars
- D** transport of water

- 29 Four strips are cut from a fresh potato. The length of each strip is measured. One strip is placed in pure water, the others in different concentrations of sugar solution.

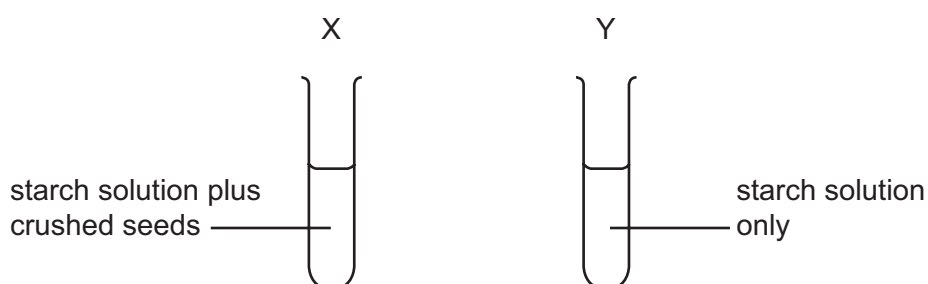
After an hour, the strips are measured again. The results are shown in the table.

Which liquid is pure water?

liquid	original length of strip /mm	final length of strip /mm
A	75	75
B	78	85
C	82	80
D	86	87

- 30 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

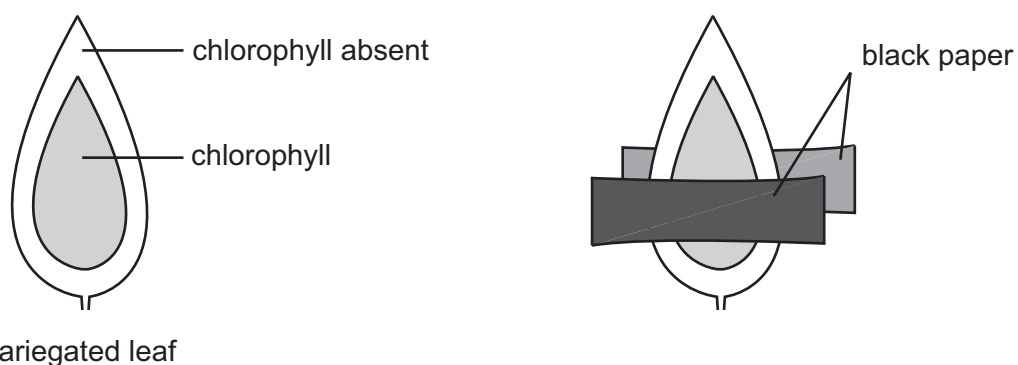
The remainder of each liquid was then tested for sugar.

Which results were obtained?

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

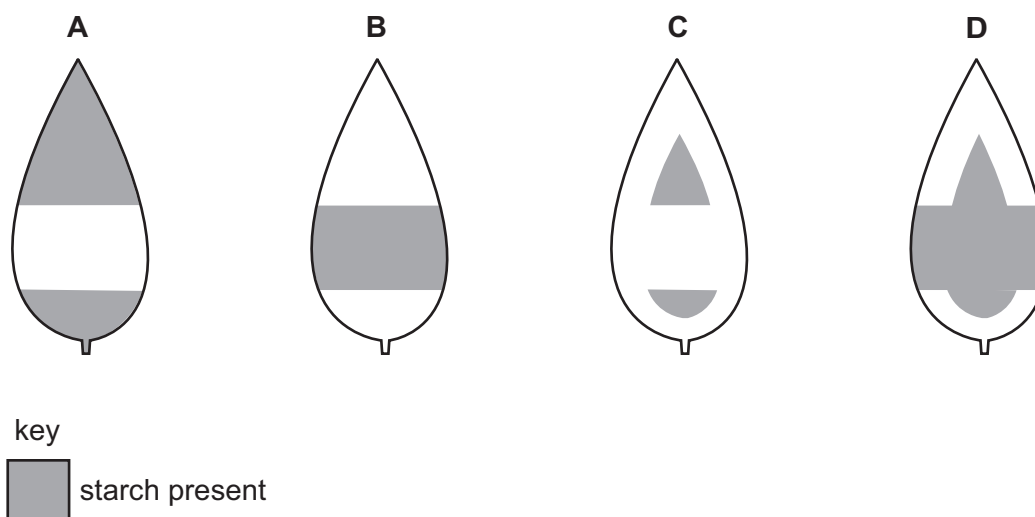
key
 ✓ = sugar present
 x = no sugar

- 31 A variegated plant is destarched. One leaf is then partly covered with a black paper strip on both sides and exposed to light.



After several hours in the light, the leaf is tested for starch.

What is the result?

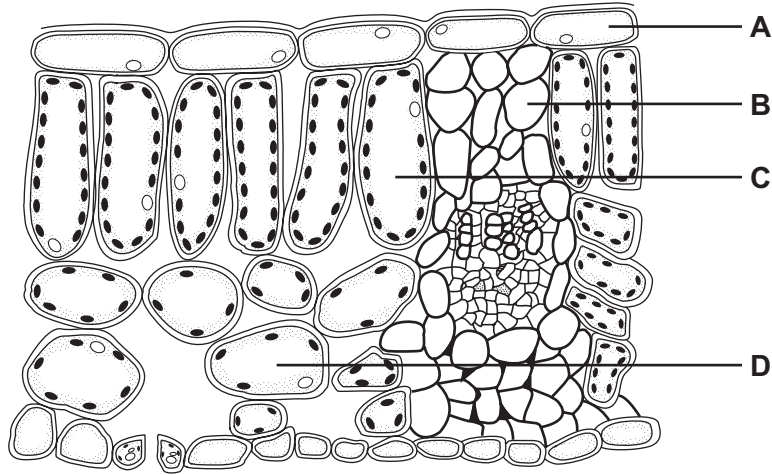


- 32 How do the muscles in the wall of the alimentary canal act when pushing food along?

	circular muscles behind food	longitudinal muscles behind food
A	contract	contract
B	contract	relax
C	relax	contract
D	relax	relax

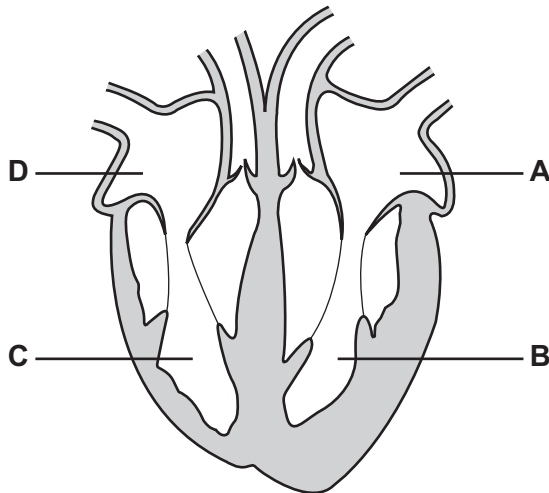
33 The diagram shows a cross-section of a leaf seen under the microscope.

During transpiration, which labelled cell will lose water fastest?



34 The diagram shows a section through a human heart.

Which chamber of the heart pumps blood to the lungs?

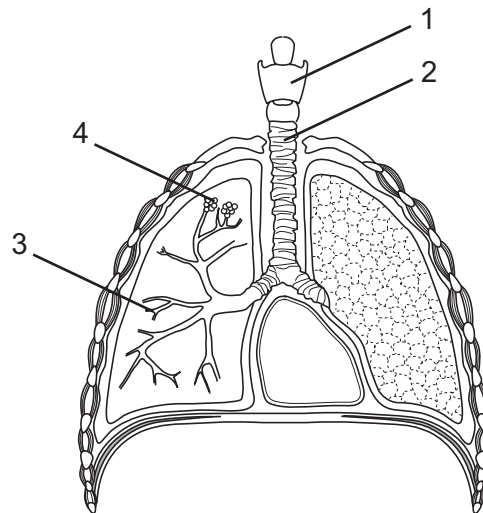


35 Which of the following can cross the placenta?

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

key
 ✓ = can cross the placenta
 x = cannot cross the placenta

36 The diagram shows part of the thorax of a person.



What are the correct labels?

	alveoli	bronchiole	larynx	trachea
A	3	2	1	4
B	3	2	4	1
C	4	3	1	2
D	4	3	2	1

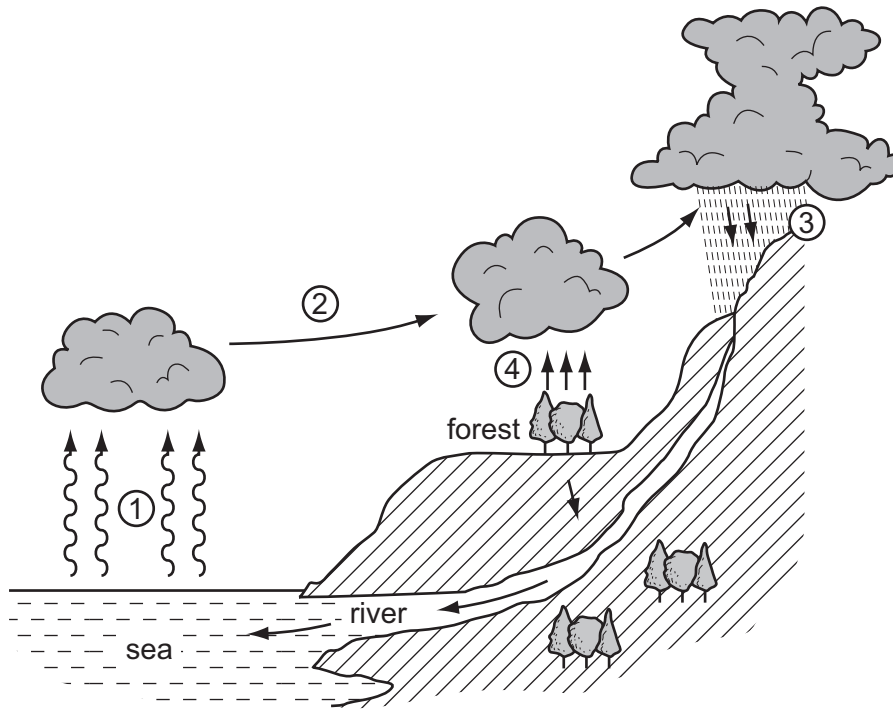
37 Which substance **cannot** pass through the membrane of a dialysis machine?

- A** protein
- B** salt
- C** urea
- D** water

38 What is the function of a motor neurone?

	transmits impulses from	transmits impulses to
A	brain or spinal cord	muscle or gland
B	brain or spinal cord	sensory neurone
C	muscle or gland	brain or spinal cord
D	muscle or gland	sensory neurone

39 The diagram represents the water cycle.

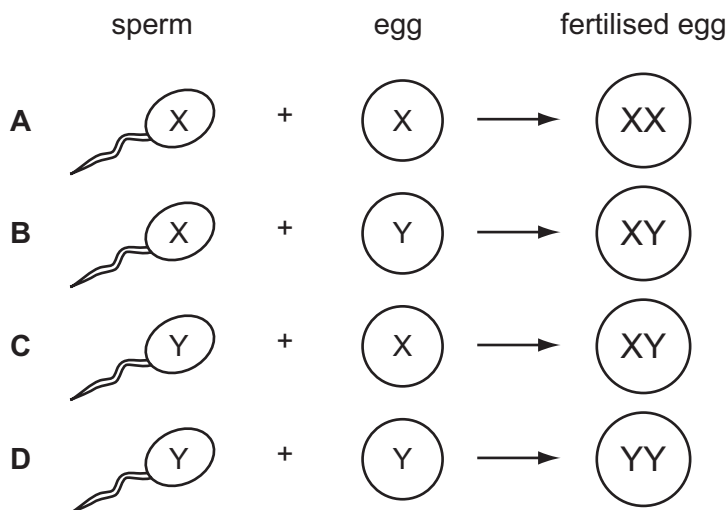


Which stages show evaporation?

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

40 A sperm fertilises an egg to produce a baby girl.

Which diagram shows how the sex chromosomes combine?



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DATA SHEET
The Periodic Table of the Elements

		Group																				
I	II	III	IV	V	VI	VII	0						0									
		1 H Hydrogen 1											4 He Helium 2									
7 Li Lithium 3	9 Be Beryllium 4												20 Ne Neon 10									
23 Na Sodium 11	24 Mg Magnesium 12												35.5 Cl Chlorine 17									
39 K Potassium 19	40 Ca Calcium 20	51 V Vanadium 23	48 Ti Titanium 22	45 Sc Scandium 21	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									
85 Rb Rubidium 37	88 Sr Strontium 38	93 Nb Niobium 41	91 Zr Zirconium 40	89 Y Yttrium 39	101 Ru Ruthenium 44	106 Pd Palladium 46	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54									
133 Cs Caesium 55	137 Ba Barium 56	181 Ta Tantalum 73	178 Hf Hafnium 72	139 La Lanthanum 57	190 Os Osmium 76	195 Pt Platinum 78	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	208 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86									
226 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89	†	†																		
<p>*58-71 Lanthanoid series †90-103 Actinoid series</p>																						
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">a</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">X</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">b</td> </tr> <tr> <td style="text-align: left;">Key</td> <td>a = relative atomic mass</td> <td>X = atomic symbol</td> </tr> <tr> <td></td> <td>b = proton (atomic) number</td> <td></td> </tr> </table>														a	X	b	Key	a = relative atomic mass	X = atomic symbol		b = proton (atomic) number	
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	b = proton (atomic) number																					
		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71									
		232 Th Thorium 90	238 Pa Protactinium 91	238 U Uranium 92	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102									

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