UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE **5130/01**

Paper 1 Multiple Choice

October/November 2004

1 hour

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

READ THESE INSTRUCTIONS FIRST

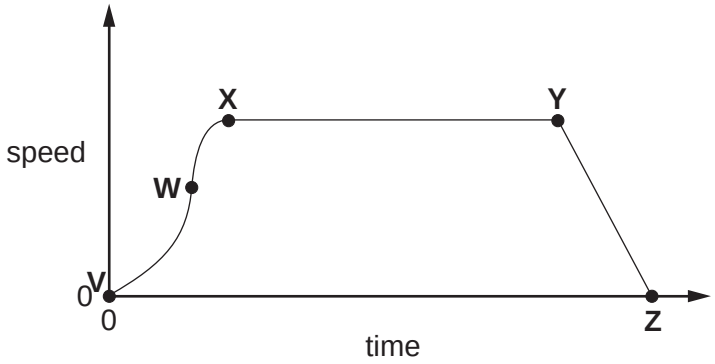
Write in soft pencil.
Do not use staples, paper clips, highlighters, glue or correction fluid.
Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has been done for you.

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 included on page 20.

1 The diagram shows a speed-time graph.



In which region is the acceleration decreasing?

A **V** to **W**

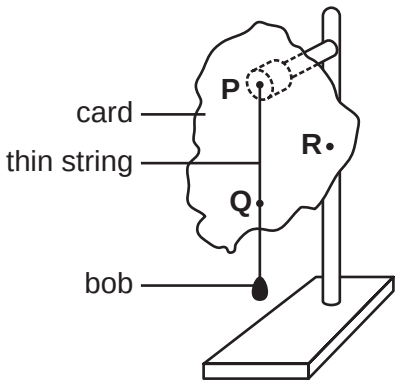
B **W** to **X**

C **X** to **Y**

D **Y** to **Z**

2 The diagram shows a step in an experiment to determine the position of the centre of mass of a thin card.

A pencil line is drawn between **P** and **Q**.



What is the next step in this experiment?

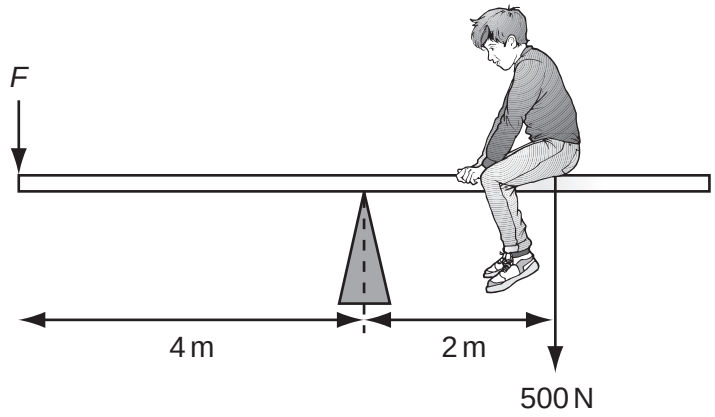
A Find the mid-point of **PQ**.

B Hang the card from point **R**.

C Measure the mass of the card.

D Measure the thickness of the card.

3 The diagram shows a boy weighing 500 N sitting on a see-saw. He sits 2 m from the pivot.



What is the force *F* needed to balance the see-saw?

A 250 N

B 750 N

C 1000 N

D 3000 N

4 Which quantity is calculated by multiplying the magnitude of a force by the distance moved in the direction of the force?

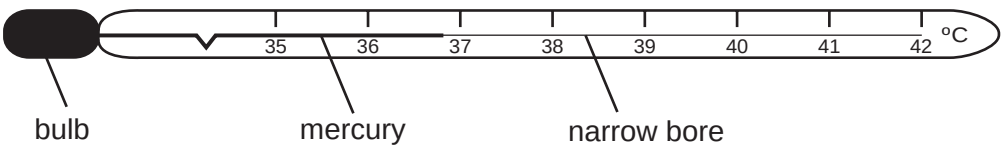
A acceleration

B power

C pressure

D work

5 The diagram shows a clinical thermometer.



Why does the stem have a very narrow bore?

A to increase the temperature range measured

B to improve its sensitivity

C to prevent mercury returning to the bulb

D to reduce the amount of mercury used

6 A wave has a frequency of 10 kHz.

What are the possible values of its velocity and wavelength?

	velocity in m / s	wavelength in m
A	330	0.33
B	330	33
C	3×10^8	30
D	3×10^8	3×10^4

7 In which situation could sound waves **not** travel

A between two spaceships in space

B from a surface ship to a submarine

C from inside a diving chamber to a microphone in water outside

D through a balloon filled with helium gas

8 Which diagram correctly shows the directions of the electrostatic forces on a pair of charged spheres?

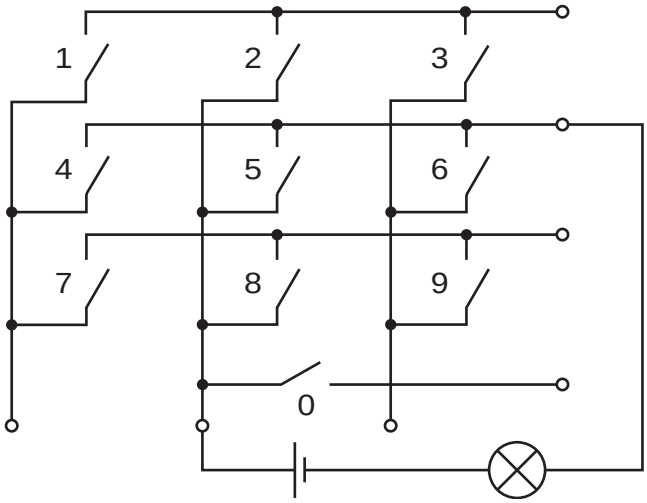
A

B

C

D

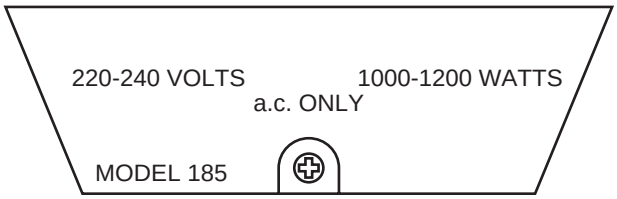
9 A student tests the circuit of a press-button telephone with a bulb and a battery.



Which single switch can be pressed to make the bulb light?

A 0 **B** 1 **C** 5 **D** 6

10 The diagram shows the information given on an electric iron.



If electricity costs 7 cents per unit, what is the cost of using this iron at maximum power for 10 hours?

A 17 cents **B** 70 cents **C** 84 cents **D** 220 cents

11 Which particles are emitted by the hot filament of a cathode ray oscilloscope and which type of field is used to accelerate them?

	particles	type of field
A	electrons	electric
B	electrons	magnetic
C	protons	electric
D	protons	magnetic

[Turn over

12 Which of the following equations represents the decay of the nuclide $^{226}_{88}Ra$ by the emission of an alpha particle?

A $^{226}_{88}Ra \rightarrow {}^{226}_{87}Fr$ + alpha particle

B $^{226}_{88}Ra \rightarrow {}^{225}_{88}Ra$ + alpha particle

C $^{226}_{88}Ra \rightarrow {}^{224}_{84}Po$ + alpha particle

D $^{226}_{88}Ra \rightarrow {}^{222}_{86}Rn$ + alpha particle

13 A nucleus of the element cobalt may be represented by the symbol $^{59}_{27}Co$.

What is the structure of a neutral atom of cobalt?

	number of protons	number of neutrons	number of electrons
A	27	59	27
B	59	27	59
C	27	32	27
D	59	32	59

14 Solution **X** contains a simple salt.

The table shows the results of some tests on solution **X**.

test	result of test
addition of aqueous sodium hydroxide	green precipitate forms
addition of acidified barium nitrate	white precipitate forms

What is the name of the salt in solution **X**?

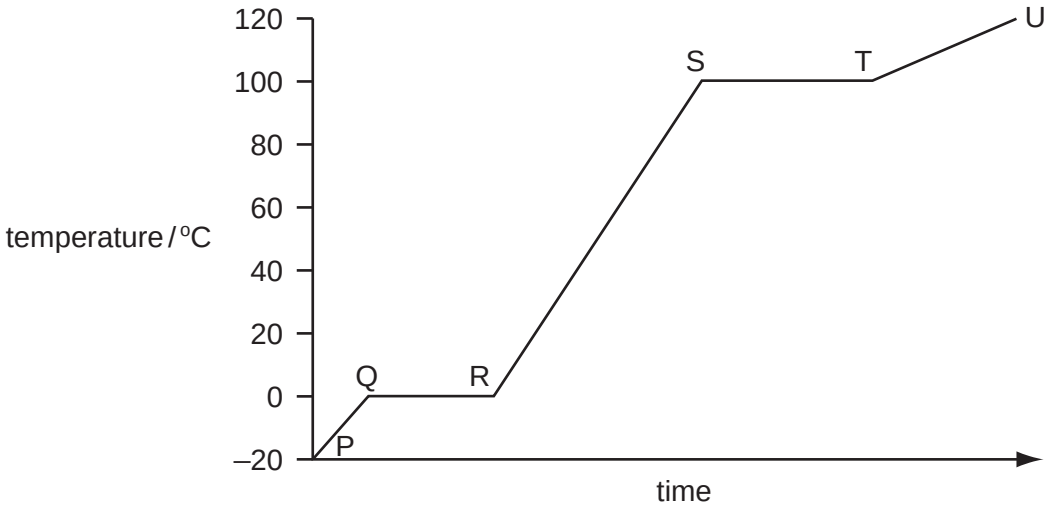
A copper(II) carbonate

B copper(II) chloride

C iron(II) sulphate

D iron(III) sulphate

15 The graph shows the change in temperature with time when ice at –20 °C is heated to 120 °C.



Which entry in the table shows the correct change taking place between the points?

	points	change
A	P to Q	average energy of particles remains constant
B	Q to R	ice melting
C	S to T	average energy of particles increasing
D	T to U	water boiling

16 The table gives data about three different particles.

particle	nucleon number	number of protons	number of neutrons	number of electrons
Al	27	13	**X**	13
F^-	19	**Y**	10	10
Mg^{2+}	24	12	12	**Z**

What are the correct values of **X**, **Y** and **Z**?

	X	**Y**	**Z**
A	13	9	10
B	13	10	12
C	14	10	12
D	14	9	10

[Turn over

17 Which substance does **not** have a macromolecular structure?

A diamond

B graphite

C silicon(IV) oxide (silica)

D sodium chloride

18 Which solution of sodium chloride has the greatest concentration?

A 0.10 mol NaCl in 0.10 dm^3 of solution

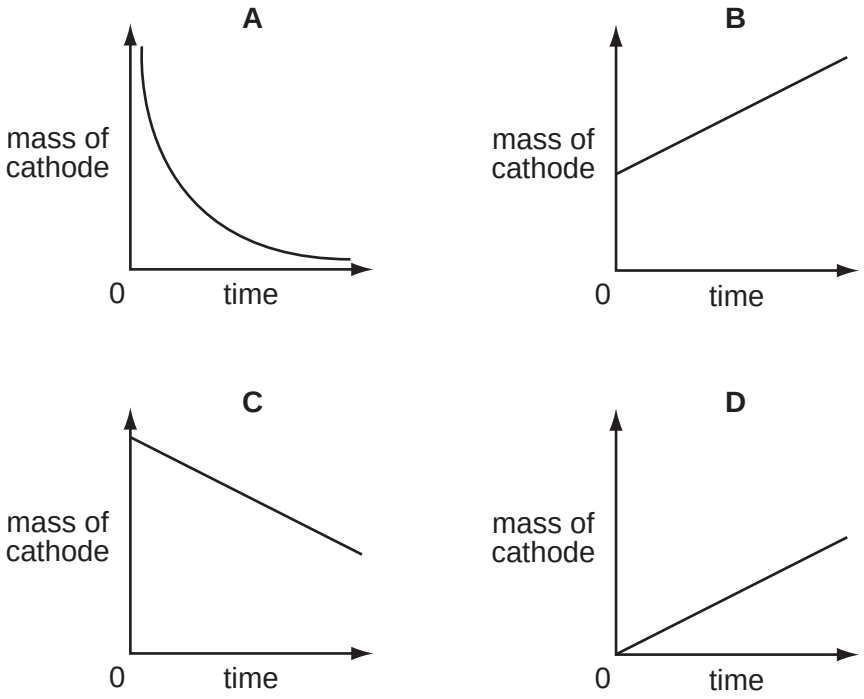
B 0.10 mol NaCl in 1.00 dm^3 of solution

C 0.01 mol NaCl in 100 cm^3 of solution

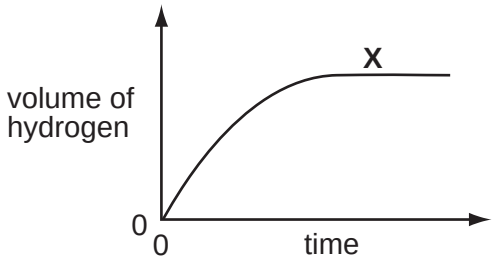
D 0.01 mol NaCl in 1000 cm^3 of solution

19 Aqueous copper(II) sulphate is electrolysed using copper electrodes. The current is constant and the cathode (negative electrode) is weighed at regular intervals.

Which graph is obtained when the mass of the cathode is plotted against time?



20 Zinc reacts with an excess of dilute sulphuric acid. The graph shows how the volume of hydrogen given off changes with time.



Why is the graph horizontal at **X**?

A All the sulphuric acid has reacted.

B All the zinc has reacted.

C Hydrogen is being produced at a constant rate.

D The reaction is beginning to slow down.

21 A sample of pond water has a pH value of 9.

This means that the water is

A weakly acidic.

B neutral.

C weakly alkaline.

D strongly alkaline.

22 Which substance removes impurities from iron ore in the blast furnace?

A carbon

B limestone

C sand

D slag

23 Which three compounds, when mixed for use as a fertiliser, provide the three essential elements needed for plant growth?

	1	2	3
A	ammonium nitrate	calcium phosphate	potassium chloride
B	ammonium nitrate	calcium phosphate	sodium nitrate
C	ammonium sulphate	calcium hydroxide	potassium chloride
D	ammonium sulphate	sodium nitrate	potassium chloride

[Turn over

24 Which process would remove **all** the impurities from impure water?

A chlorination

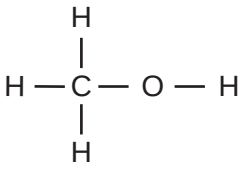
B distillation

C filtration

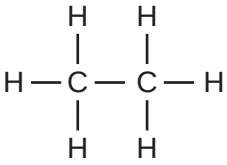
D neutralisation

25 The diagrams show the structures of four organic molecules.

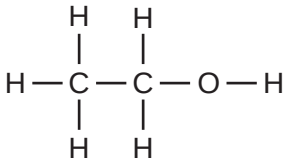
P



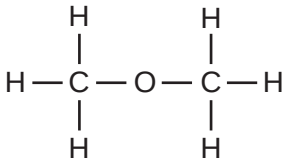
Q



R



S

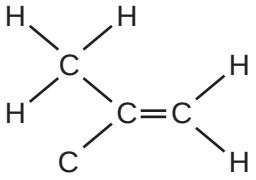


Which two are members of the same homologous series?

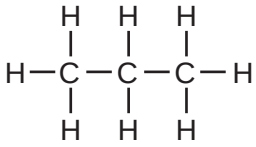
A P and R **B** P and S **C** Q and R **D** R and S

26 Which of the following will decolourise aqueous bromine?

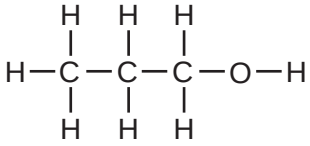
A



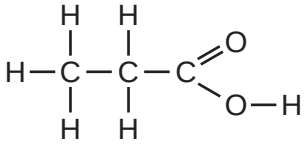
B



C



D



27 Ethanol is produced from starch as follows

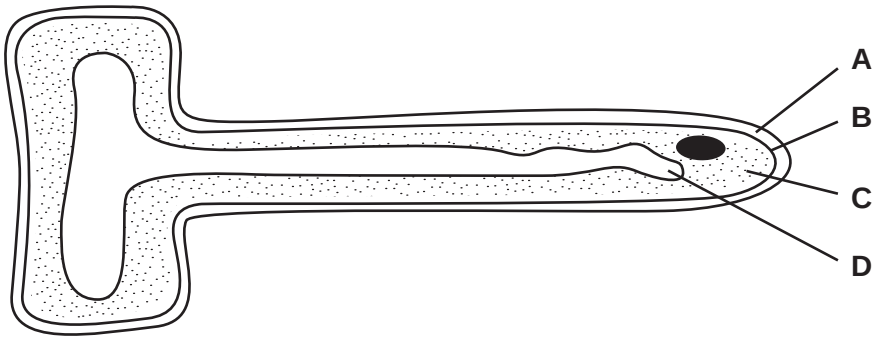
$$\text{starch} \xrightarrow{\text{stage 1}} \text{simple sugars} \xrightarrow{\text{stage 2}} \text{ethanol}$$

Which terms are used to describe these two stages?

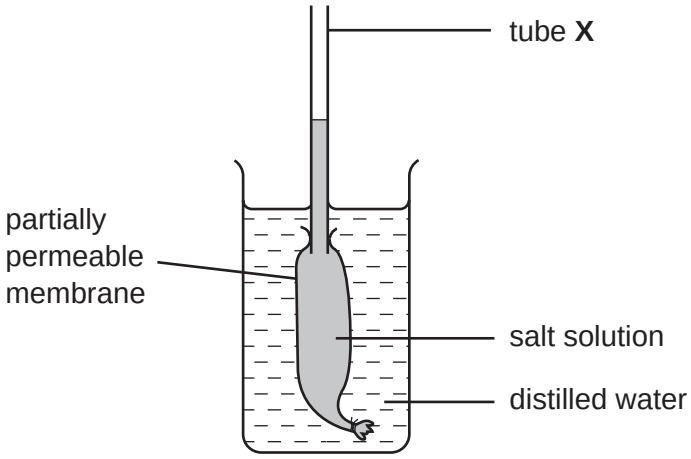
	stage 1	stage 2
A	cracking	oxidation
B	fermentation	distillation
C	hydrolysis	fermentation
D	polymerisation	hydrolysis

28 The diagram shows a root hair cell.

Which structure controls the uptake of nitrate ions into the cell?



29 An experiment to investigate osmosis is set up as shown.

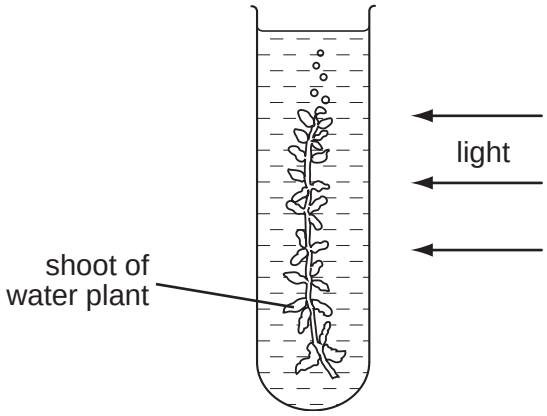


What happens to the volume of the liquid in tube **X** and the concentration of the salt solution?

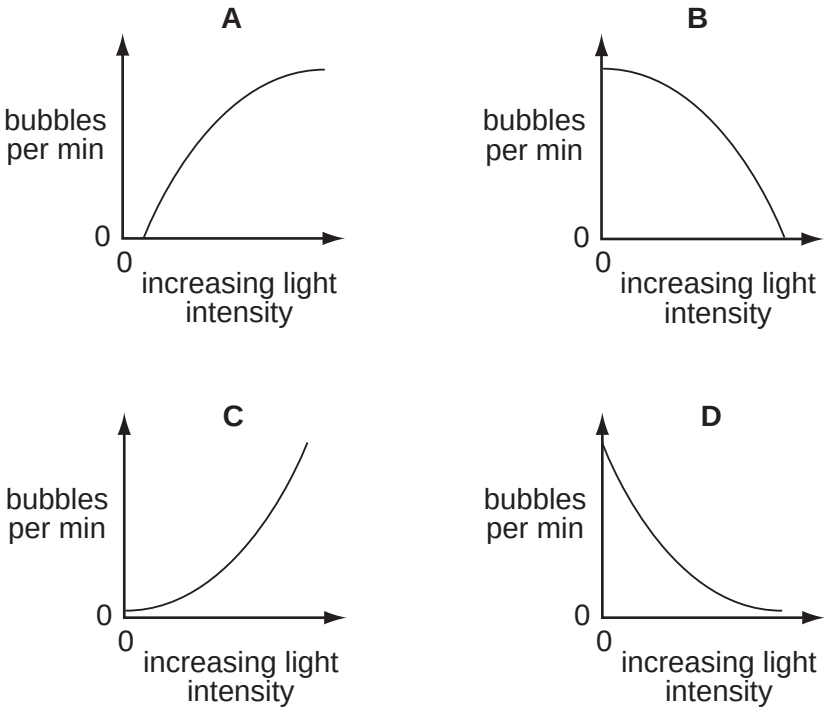
	volume of the liquid in tube **X**	concentration of salt solution
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

30 The diagram shows an investigation into the effect of the intensity of light on the rate of photosynthesis. The rate is measured by counting the number of bubbles released per minute.

The experiment is repeated using different light intensities.



Which graph shows the result of the investigation?

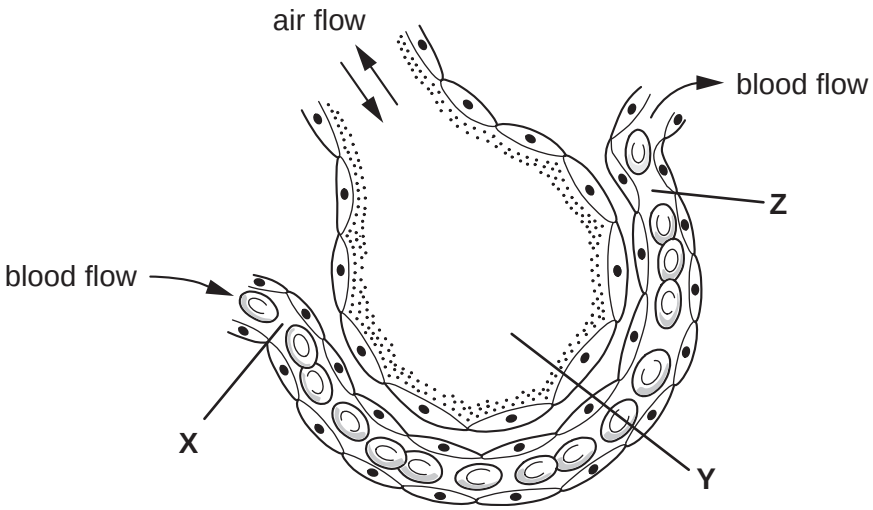


31 The table shows the recommended daily intake of energy and of iron for females at four different ages: 6 months, 5 years, 25 years and 75 years.

Which shows the recommended daily intake for the 25 year old?

	energy / MJ	iron / mg
A	2.7	4.3
B	6.5	6.1
C	7.6	8.7
D	8.1	14.8

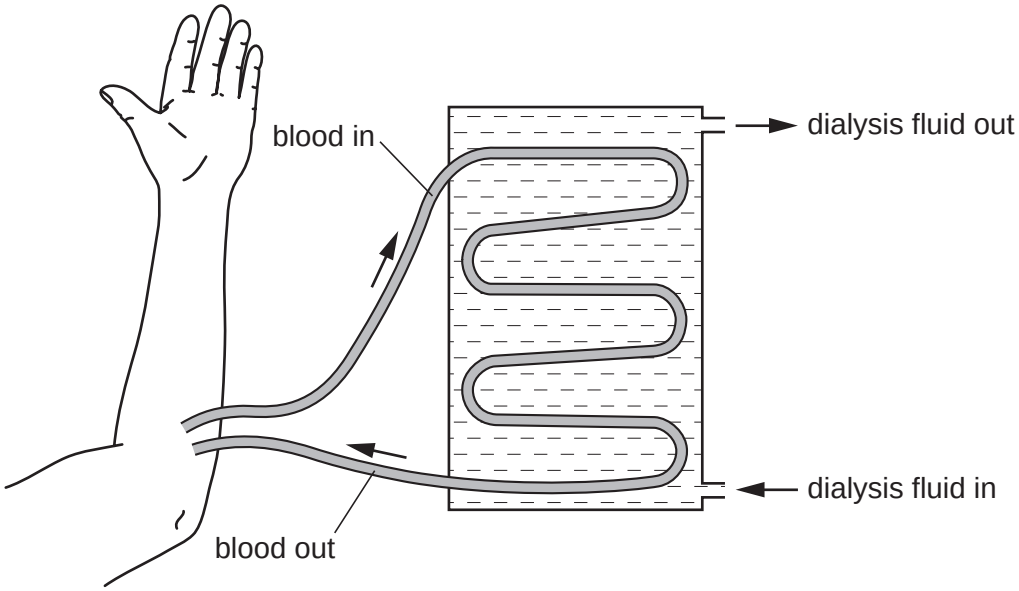
32 The diagram shows a section through an alveolus and a blood capillary.



What are the oxygen concentrations in **X**, **Y** and **Z**?

	X	**Y**	**Z**
A	high	low	high
B	high	low	low
C	low	high	high
D	low	high	low

33 The diagram shows a kidney machine.



Which substance must be at the same concentration in the dialysis fluid and in the blood?

A glucose

B salt

C urea

D water

34 Which disease can be cured by antibiotics?

A AIDS

B diabetes

C emphysema

D gonorrhoea

35 What is the principal source of energy input to biological systems?

A carbohydrates from plants

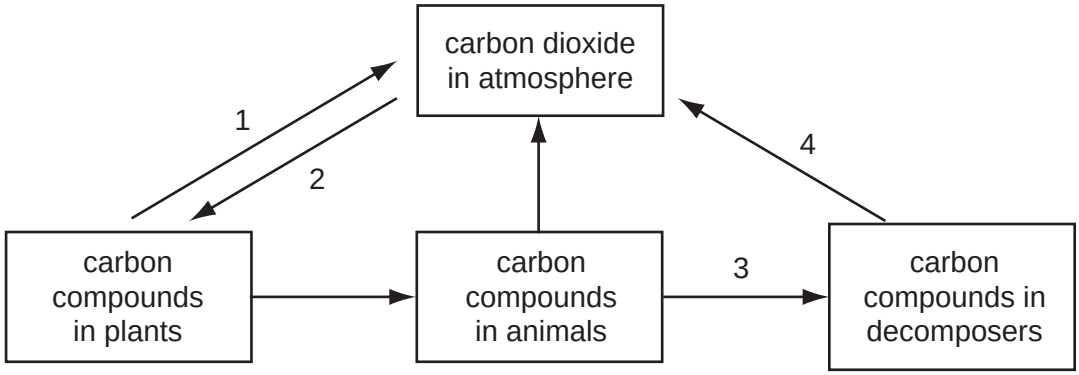
B light from the Sun

C nutrients from the soil

D oxygen from the air

[Turn over

36 The diagram shows part of the carbon cycle.



Which numbered arrows represent respiration?

A 1 and 3

B 1 and 4

C 2 and 3

D 2 and 4

37 What is an effect of releasing untreated sewage into the environment?

A death of fish from lack of oxygen

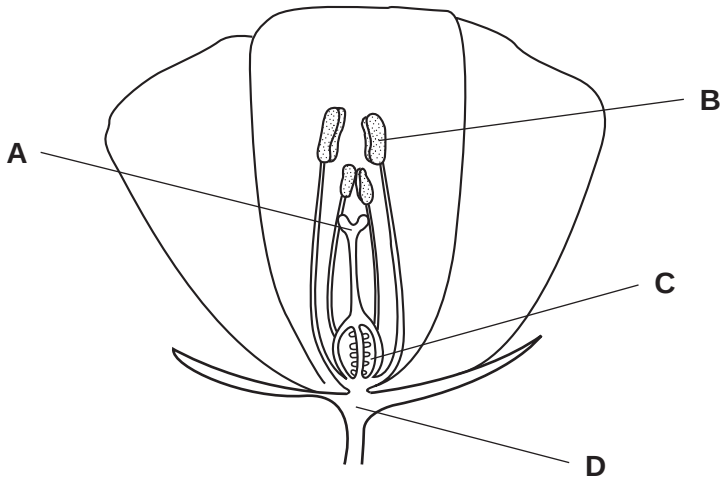
B increased carbon dioxide in the atmosphere

C increased sulphur dioxide in the atmosphere

D using up of soil minerals

38 The diagram shows a flower cut in half.

Which part must receive pollen grains before fertilisation can take place?



39 How are sperms different from egg cells in size and in number?

	size	number
A	larger	fewer
B	larger	more
C	smaller	fewer
D	smaller	more

40 Some normal fruit flies are subjected to radiation in a laboratory. As a result, they produce offspring with unusual characteristics, such as white eyes.

What causes this?

A continuous variation

B discontinuous variation

C dominance

D mutation

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DATA SHEET
The Periodic Table of the Elements

Group																		
I	II										III	IV	V	VI	VII	0
																4 He Helium 2
						1 H Hydrogen 1					11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
7 Li Lithium 3	9 Be Beryllium 4										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
23 Na Sodium 11	24 Mg Magnesium 12										70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
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 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	127 I Iodine 53				
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	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	Rn Radon 86
226 Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89													At Astatine 85	

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	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	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*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 dm^3 at room temperature and pressure (r.t.p.).