UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE **5129/01**

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.

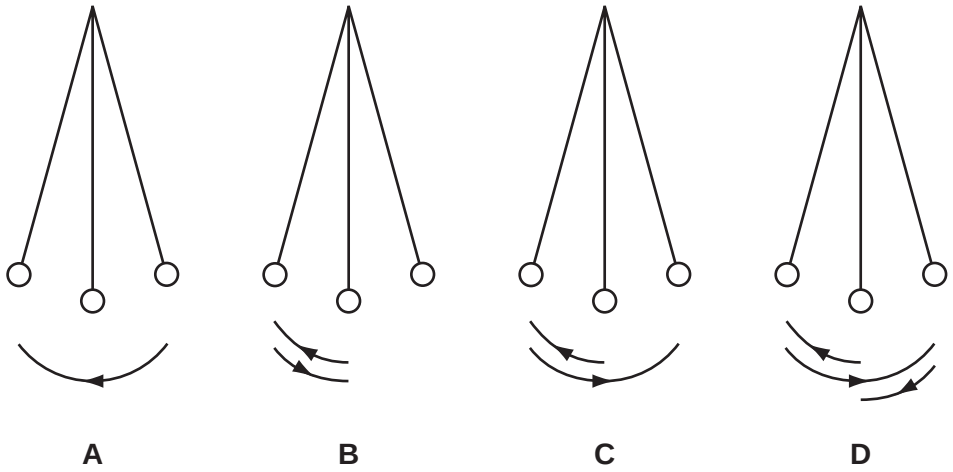
Read the instructions on the Answer Sheet very carefully.

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 **15** printed pages and **1** blank page.

1 The diagrams show a simple pendulum at the ends and centre of its swing.

Which labelled arrow shows the distance moved by the pendulum during one period?

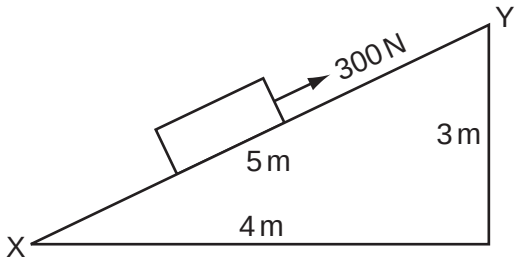


2 The mass and density of four objects are given in the table.

Which object has the largest volume?

	$\frac{\text{density}}{\text{kg/m}^3}$	mass / kg
A	200	0.6
B	400	1.0
C	1000	2.0
D	1500	3.0

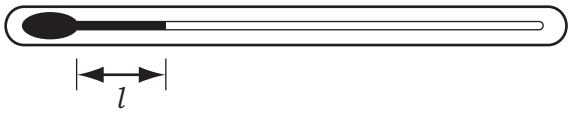
3 A 300 N force is applied to a box in the direction XY in order to move it up a ramp of the dimensions shown.



How much work is done when moving the box from X to Y?

A 900 J **B** 1200 J **C** 1500 J **D** 3000 J

4 A liquid-in-glass thermometer is being calibrated.



At the ice point, the thread length l, is 2.0 cm. At the steam point, l is 27.0 cm.

What change in length shows a temperature difference of 1 °C?

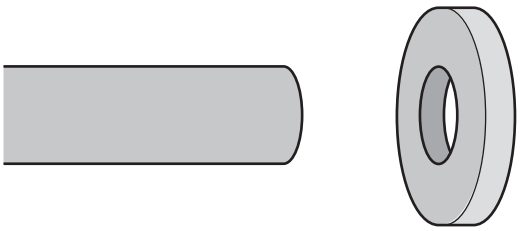
A 0.25 cm

B 0.27 cm

C 2.5 cm

D 2.7 cm

5 An axle is too large to fit into the hole in a wheel that is made of the same metal.



How can the axle be made to fit into the hole?

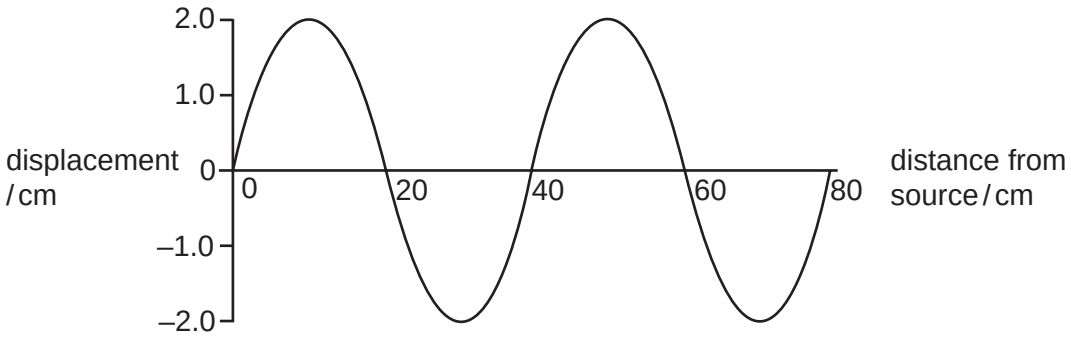
A by heating the axle alone

B by heating the wheel alone

C by cooling both the axle and the wheel

D by heating both the axle and the wheel

6 The diagram shows the variation of the displacement of a wave with distance from the source.

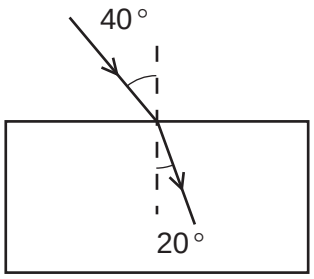


What is the amplitude of the wave?

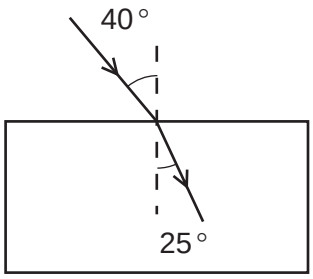
A 2.0 cm **B** 4.0 cm **C** 20 cm **D** 40 cm

7 Which block is made from the material with a refractive index of 1.52?

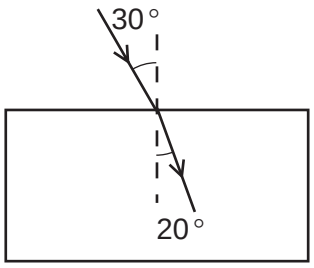
A



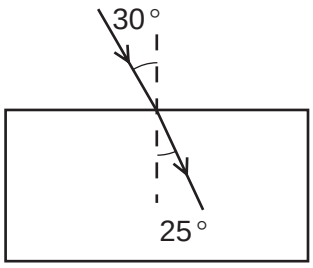
B



C



D



8 Radio waves, visible light and X-rays are all part of the electromagnetic spectrum.

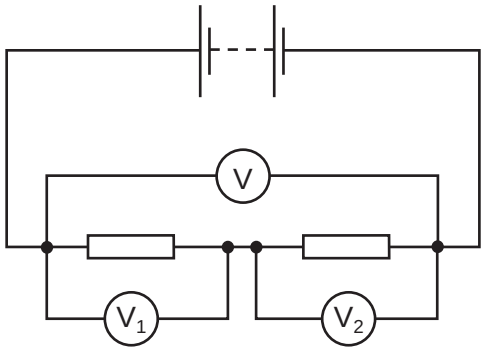
What is the correct order of increasing wavelength?

	shortest wavelength →		longest wavelength
A	visible light	radio waves	X-rays
B	visible light	X-rays	radio waves
C	X-rays	radio waves	visible light
D	X-rays	visible light	radio waves

9 How could the unit of potential difference, the volt, also be written?

A A/s **B** C/A **C** C/J **D** J/C

10 The circuit shows three voltmeters being used to measure potential differences in a s



Which of the following is correct?

A $V = V_1 = V_2$

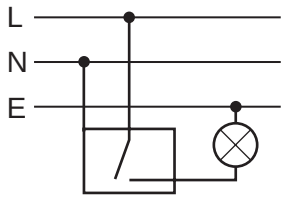
B $V = V_1 + V_2$

C $V = V_1 - V_2$

D $V = V_1 \times V_2$

11 Which diagram shows the correct connections for a switch and a lamp in a lighting circuit?

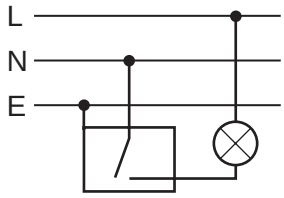
A



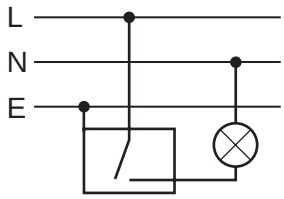
key

L	live
N	neutral
E	earth
▭	metal case

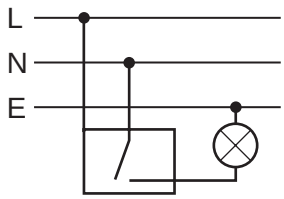
B



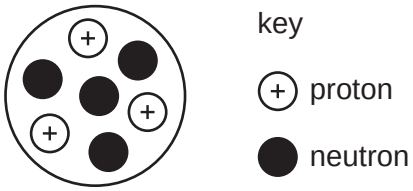
C



D



12 The diagram represents a nucleus of element **X**.



Which of the following represents the nuclide of this element?

A $^{3}_{4}\mathbf{X}$ **B** $^{4}_{3}\mathbf{X}$ **C** $^{7}_{3}\mathbf{X}$ **D** $^{7}_{4}\mathbf{X}$

13 A research worker wants to use a radioactive source with a count rate of 100 counts per second for an experiment he plans to start at 10.00 a.m.

He has four different sources, each of which has a count rate of 400 per second at 9.00 a.m.

Which source should he choose?

A a source with a half-life of 15 minutes

B a source with a half-life of 20 minutes

C a source with a half-life of 30 minutes

D a source with a half-life of 40 minutes

14 Potassium nitrate crystals can be separated from sand by using the processes shown.

What is the correct order for the processes?

	first →			last
A	filter	dissolve	evaporate	crystallise
B	dissolve	evaporate	crystallise	filter
C	dissolve	evaporate	filter	crystallise
D	dissolve	filter	evaporate	crystallise

15 Which statement about the molecules in ice is correct?

A The molecules all move with the same speed.

B The molecules are diatomic.

C The molecules move randomly.

D The molecules vibrate about fixed positions.

16 Strontium has an isotope of nucleon number 90.

How many protons, neutrons and electrons are present in an atom of this isotope?

	protons	neutrons	electrons
A	38	50	38
B	38	52	38
C	38	52	40
D	40	50	38

17 Under what conditions does sodium chloride conduct electricity?

	conducts electricity		
	when solid	when molten	in aqueous solution
A	no	no	no
B	no	yes	yes
C	yes	no	no
D	yes	yes	yes

18 How many electrons are shared in the covalent bonds in a methane molecule?

A 2 **B** 4 **C** 6 **D** 8

19 A 6 g sample of pure carbon is completely burned in oxygen.

$$C + O_2 \rightarrow CO_2$$

Which mass of carbon dioxide is produced?

A 12 g **B** 22 g **C** 38 g **D** 44 g

20 The pH values of four aqueous solutions are shown.

Which solution contains a weak acid?

	pH value
A	2
B	5
C	7
D	9

21 Which statement about the elements in Group I of the Periodic Table is correct?

A The proton (atomic) number of an element is one greater than that of the element abo

B They are equally reactive.

C They become less metallic as the proton (atomic) number increases.

D They form chlorides of similar formula.

22 An experiment is carried out to find the order of reactivity of some metals.

Three metals are placed in separate solutions containing an aqueous metal ion.

The results are shown.

metal	aqueous metal ion			
	Mg^{2+}	Al^{3+}	Fe^{2+}	Zn^{2+}
Mg	✗	✓	✓	✓
Fe	✗	✗	✗	✗
Zn	✗	✗	✓	✗

key
✓ = reaction observed
✗ = no reaction observed

What is the order of reactivity of the metals (most reactive first)?

A Mg Zn Fe Al

B Fe Zn Al Mg

C Mg Al Zn Fe

D Mg Al Fe Zn

23 Aluminium cooking utensils are used in many kitchens.

What property of aluminium is **not** important for this use?

A It has a high melting point.

B It is a good conductor of electricity.

C It is a good conductor of heat.

D It is resistant to corrosion.

24 What is the main constituent of natural gas?

A ethane

B helium

C hydrogen

D methane

25 Octane is an alkane containing eight carbon atoms per molecule.

What is its molecular formula?

A C_8H_{14} **B** C_8H_{16} **C** C_8H_{18} **D** C_8H_{20}

26 A hydrocarbon has the formula C_6H_{12}.

Which observation could confirm the homologous series to which the hydrocarbon belongs?

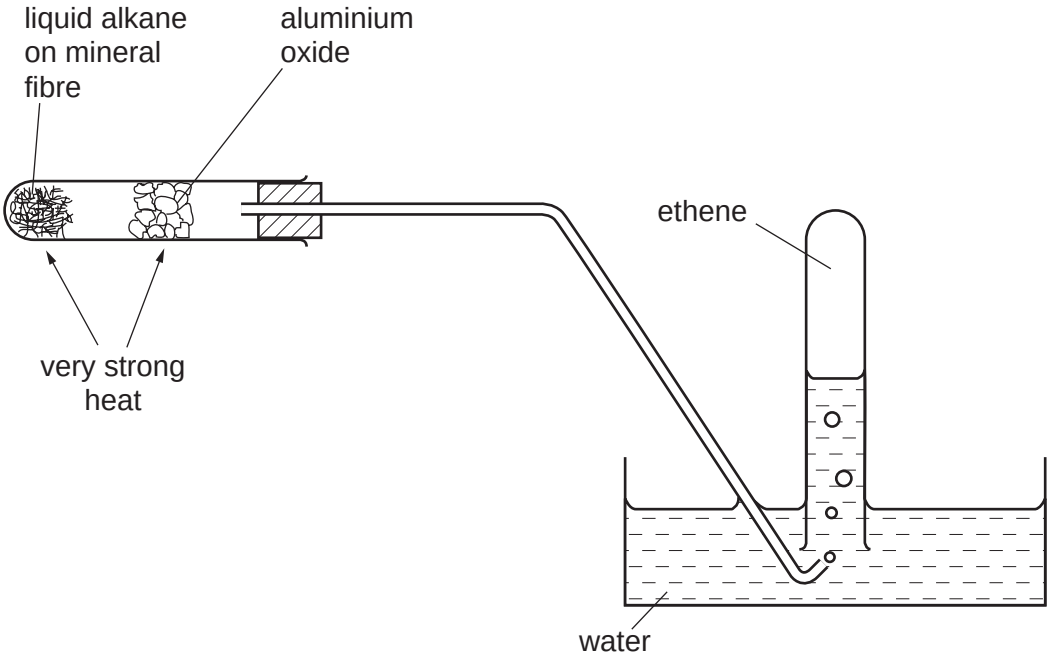
A burning in air with a sooty flame

B decolourising aqueous bromine

C effervescence when mixed with sodium carbonate solution

D turning Universal Indicator blue

27 The experiment shown is carried out.



Which process occurs?

A cracking

B dehydrogenation

C distillation

D polymerisation

28 Which part of the structure of a root hair cell is the site of uptake of water?

A cell membrane

B cell wall

C cytoplasm

D sap vacuole

29 Which of these processes **always** involves the movement of water molecules?

	diffusion	osmosis
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

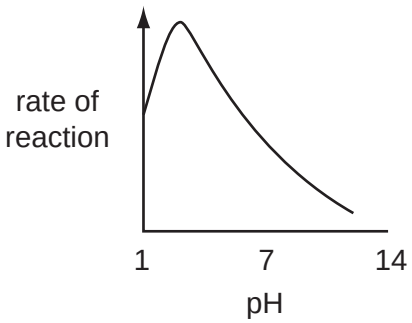
✓ yes

✗ no

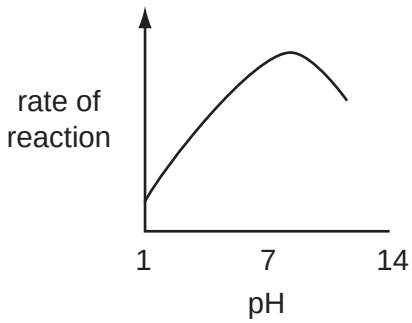
30 Pepsin is an enzyme that is active in the human stomach.

Which graph shows how the rate of reaction of pepsin is affected by pH?

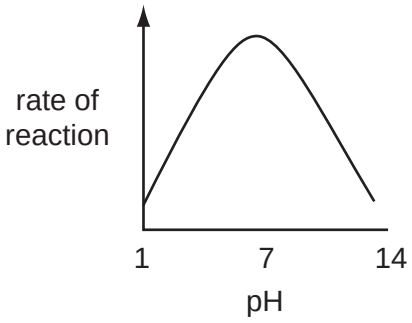
A



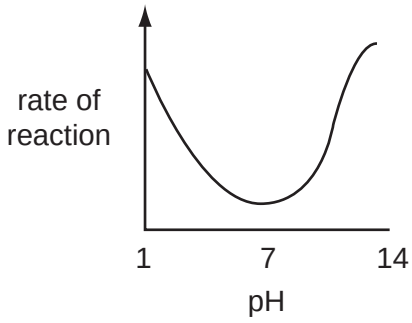
B



C

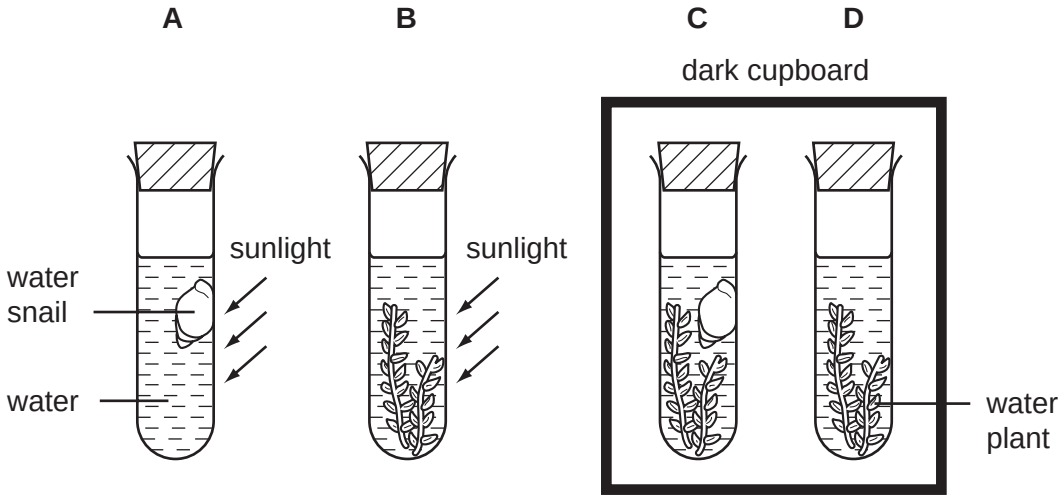


D



31 An experiment is set up as shown, and left for one hour.

In which test-tube does the concentration of carbon dioxide **decrease**?



32 Which processes are functions of the liver?

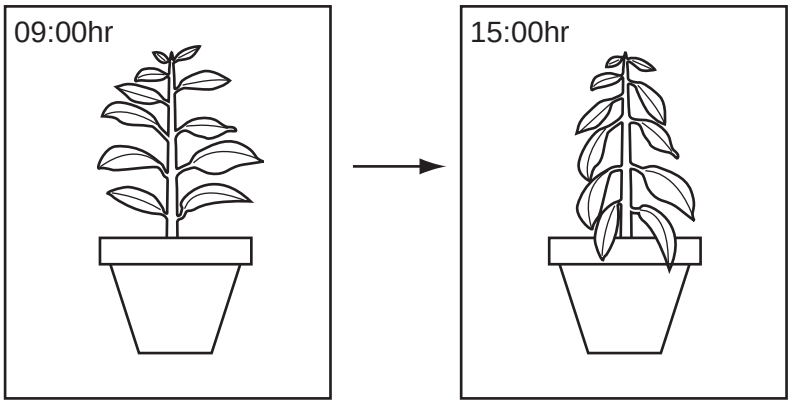
	absorbing food	assimilating food	helping with digestion of food
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

key

✓ = is a function

✗ = is not a function

33 A plant is left in the hot sun for six hours.



The diagram shows how the appearance of the plant changes during this time.

What explains the change in appearance of the plant?

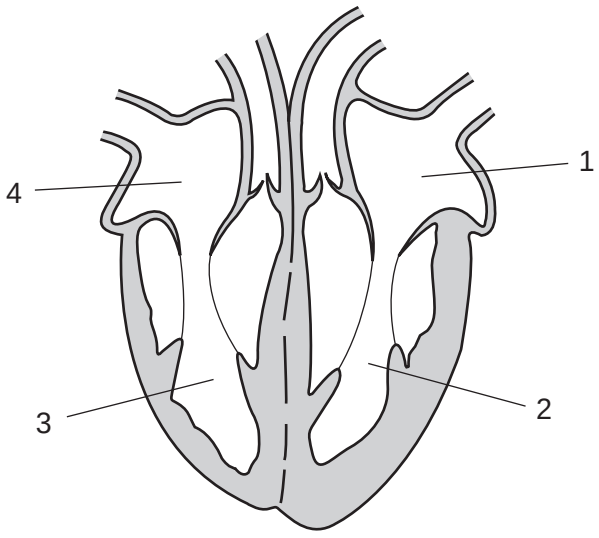
A More water is lost by transpiration than is absorbed.

B Stomata have closed.

C The concentration of water in the cells has increased.

D There is less support provided by the xylem.

34 The diagram shows a section of the heart.

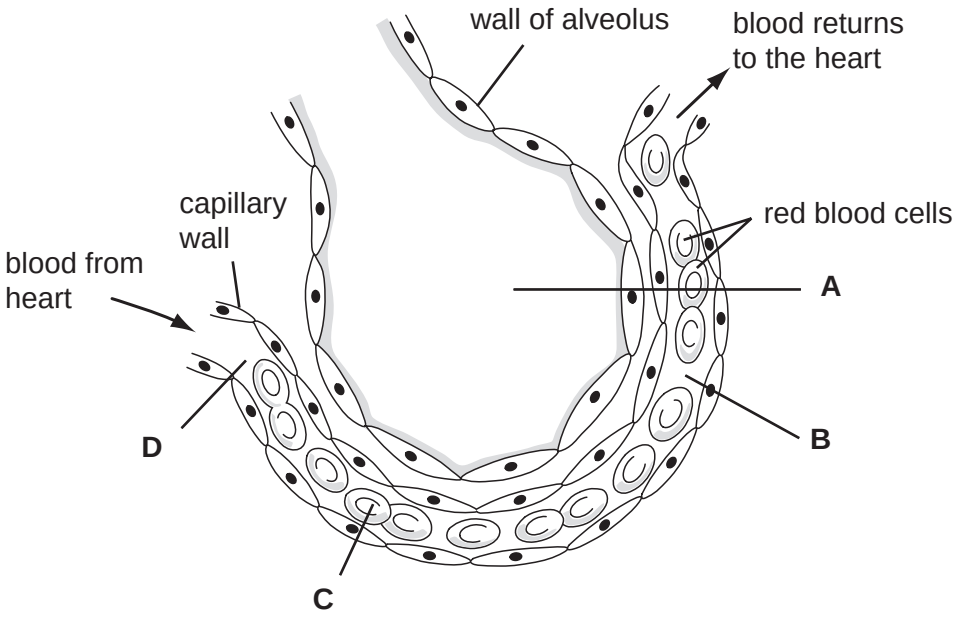


Which two chambers of the heart contain oxygenated blood?

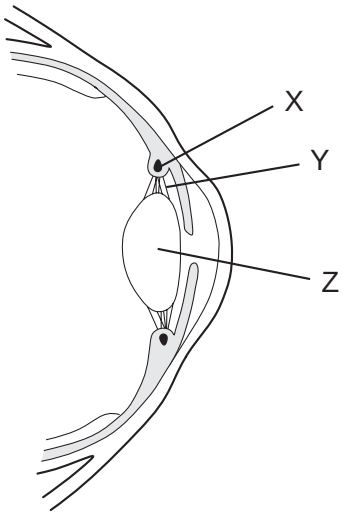
A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

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

In which part is the concentration of carbon dioxide highest?



36 The diagram shows a section through part of the eye.



What happens to parts X, Y and Z when the eye focuses on a near object?

	X	Y	Z
A	contracts	tight	less convex
B	contracts	slack	more convex
C	relaxes	tight	less convex
D	relaxes	slack	more convex

37 Many drugs affect the nervous system by acting as depressants.

Which of these drugs are depressants?

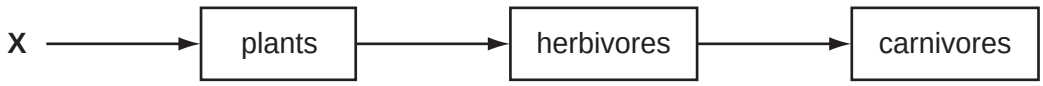
	alcohol	heroin
A	✓	✓
B	✗	✗
C	✓	✗
D	✗	✓

key

✓ = depressant

✗ = not a depressant

38 The diagram represents the energy flow through a food chain.



What provides the energy source (**X**) for this food chain?

A decomposers

B herbivores

C plants

D sunlight

39 In a tropical rainforest which of these processes is linked to the removal of carbon dioxide from the atmosphere?

A decay

B new plant growth

C respiration

D transpiration

40 What will be most likely to produce flowers of the same type and colour?

A growing plants from the seeds of one parent

B growing plants that have been produced by asexual reproduction

C growing plants at the same temperature

D growing plants in the same light intensity

BLANK PAGE

DATA SHEET
The Periodic Table of the Elements

Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group 0
							1 H Hydrogen 1										4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											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
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	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	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	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	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	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

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.).