UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE **5129/01**

Paper 1 Multiple Choice **October/November 2007**

1 hour

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

8373088286

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.

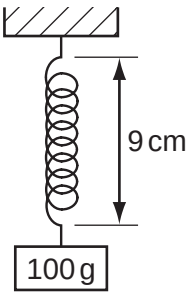
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

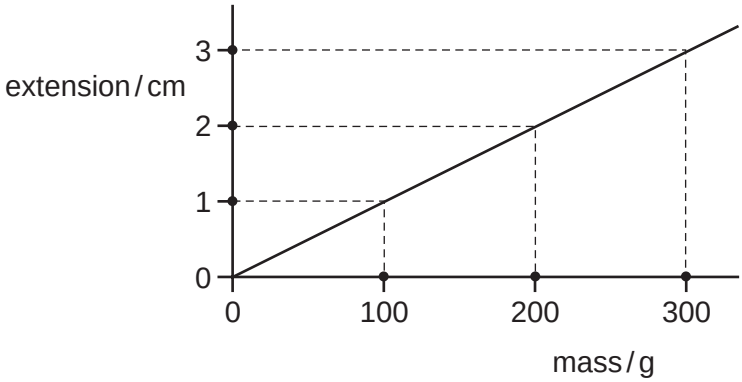
Read the instructions on the Answer Sheet very carefully.

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 **17** printed pages and **3** blank pages.

1 The diagrams show a spring having a length of 9 cm when loaded with a 100 g mass, and the extension-mass graph for the spring.





What is the length of the spring after the 100 g mass has been removed?

A 7 cm **B** 8 cm **C** 9 cm **D** 10 cm

2 Which type of energy is converted to thermal energy when atoms combine?

A chemical

B kinetic

C nuclear

D solar

3 Equal volumes of four substances are heated at atmospheric pressure.

The temperature rise is the same for each substance.

Which substance expands the most?

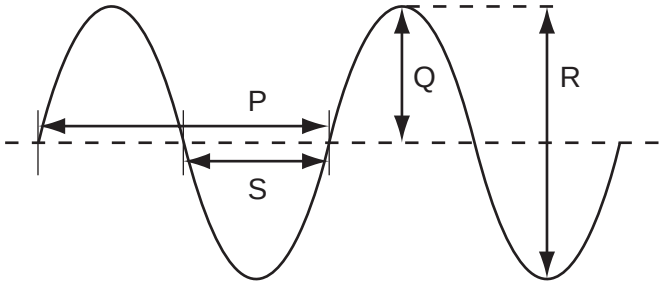
A air

B mercury

C steel

D water

4 The diagram shows the surface of the water as a wave passes across a ripple tank.



Which lengths represent the amplitude and wavelength?

	amplitude	wavelength
A	Q	P
B	Q	S
C	R	P
D	R	S

5 A wave has a frequency of 10^4 Hz.

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

6 Which type of electromagnetic radiation travels at the highest speed through a vacuum?

A gamma rays

B light waves

C radio waves

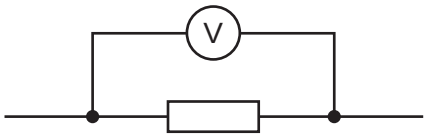
D none – all have the same speed

7 A lightning flash carries 25 C of charge and lasts for 0.01 s.

What is the current?

A 0.0004A **B** 0.25 A **C** 25 A **D** 2500 A

8 A voltmeter is connected across a resistor in an electrical circuit.



What does the reading on the voltmeter measure?

A the work done in driving 1 A of current through the resistor

B the work done in driving 1 C of charge through the resistor

C the work done in driving 1 J of energy through the resistor

D the work done in driving 1 W of power through the resistor

9 A 1.0 Ω resistor and a 2.0 Ω resistor are connected in series across a 12 V d.c. supply.

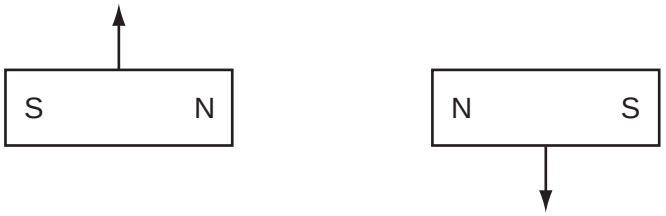
What is the current in the circuit?

A 12 A **B** 6.0 A **C** 4.0 A **D** 0.25 A

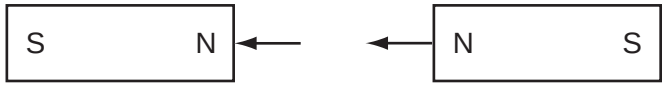
10 Which diagram shows the correct directions of the magnetic forces on two bar magnets?

A

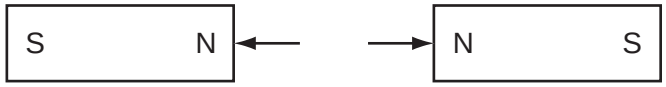
B



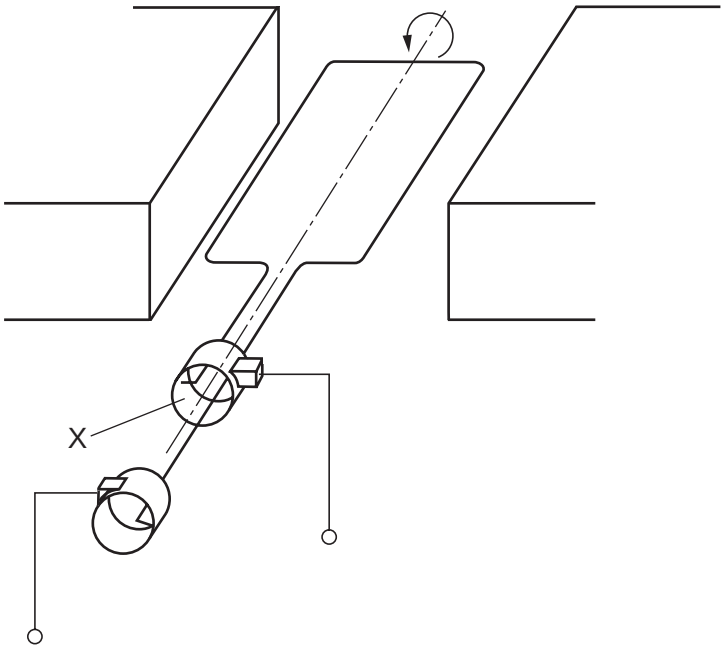
C



D



11 The diagram shows a simple a.c. generator.



Which name is given to part X?

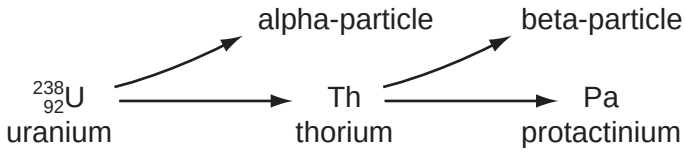
A axle

B carbon brush

C magnet

D slip ring

12 The uranium atom $^{238}_{92}U$ emits an alpha-particle to become thorium, which then emits a beta-particle to become protactinium.

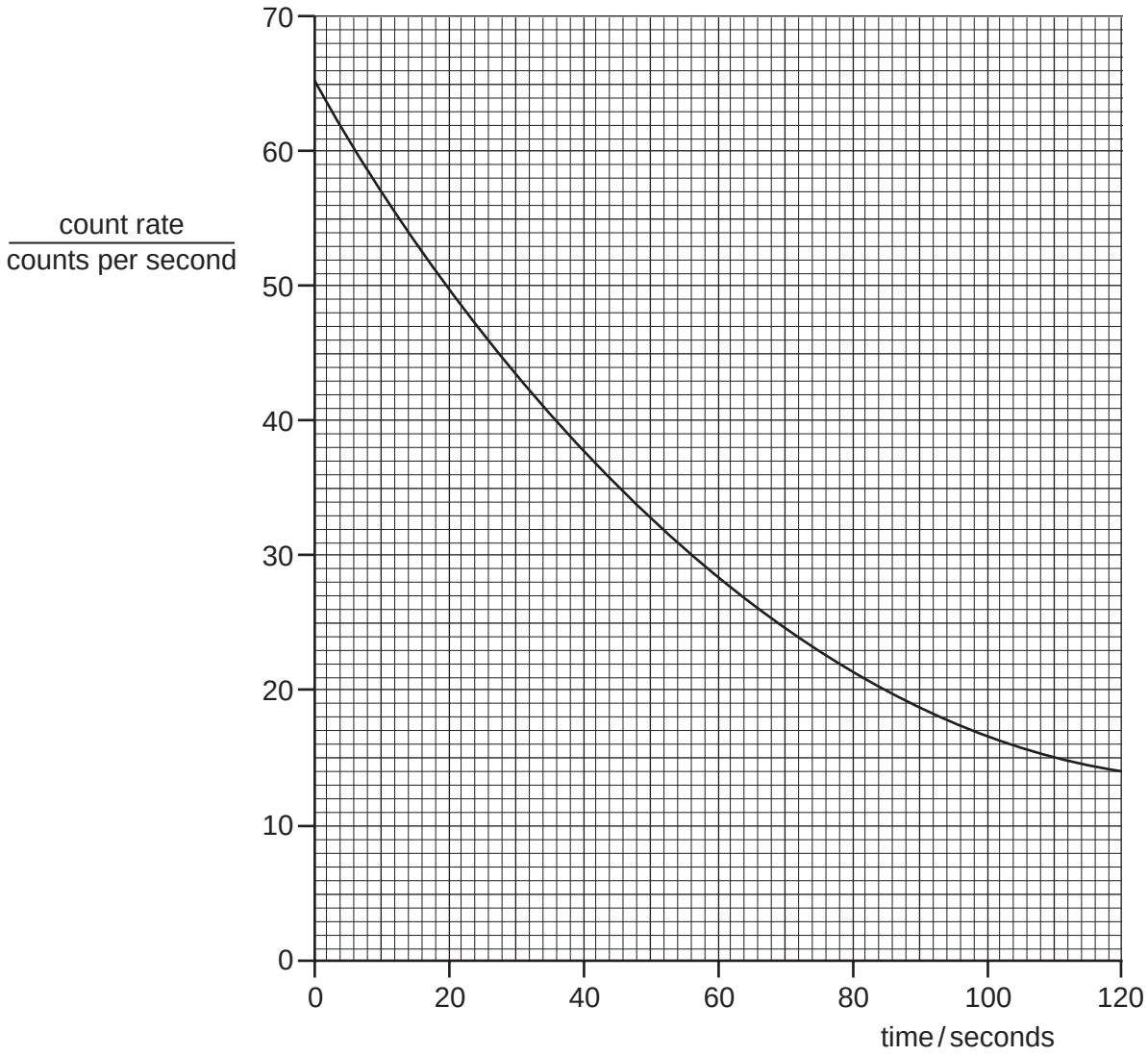


What is the proton number (atomic number) of protactinium?

A 89 **B** 90 **C** 91 **D** 95

13 Ra decays with a half-life of 1600 s.
Rn decays with a half-life of 52 s.
Po decays with a half-life of 9.1 s.
Pb decays with a half-life of 10.6 h.

The changing count rate for one of these radioactive nuclides is shown in the graph.



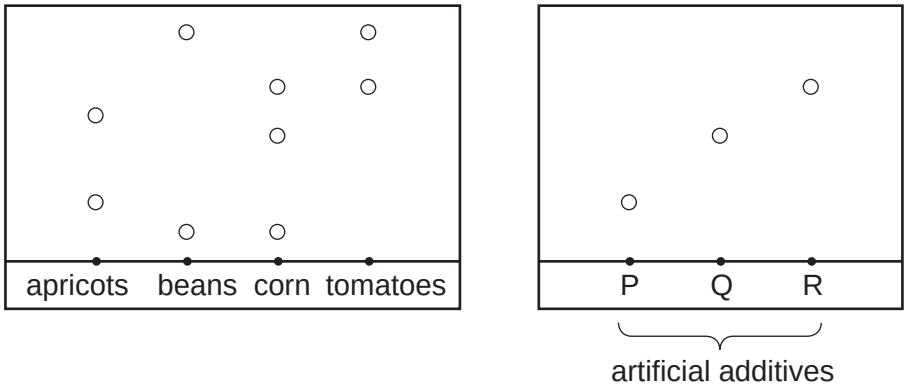
From the half-life shown by the graph, which was the decaying radioactive nuclide?

A Ra **B** Rn **C** Po **D** Pb

14 Samples of tinned apricots, beans, corn and tomatoes are tested for additives by using chromatography.

The chromatograms are compared with those of three artificial additives, P, Q and R.

The results are as follows.



Which tinned food does **not** contain any artificial additives?

A apricots

B beans

C corn

D tomatoes

15 Element X has proton number 8 and nucleon number 18.

Which particles are present in the X^{2-} ion?

A 10 electrons, 8 protons, 8 neutrons

B 10 electrons, 8 protons, 10 neutrons

C 10 electrons, 9 protons, 9 neutrons

D 8 electrons, 8 protons, 18 neutrons

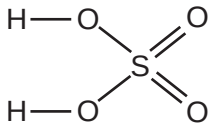
16 The table gives the electronic structure of four elements.

element	electronic structure
W	2.7
X	2.8.5
Y	2.8.6
Z	2.8.8.2

Which two elements form an ionic compound?

A W and X **B** W and Y **C** W and Z **D** X and Y

17 A molecule of sulphuric acid has the structural formula shown.



How many electrons are involved in forming all the covalent bonds in one molecule?

A 6 **B** 8 **C** 12 **D** 16

18 The formula of copper(I) oxide is Cu_2O.

How many grams of oxygen are combined with 64 g of copper in this compound?

A 8 **B** 16 **C** 32 **D** 64

19 Which type of reaction takes place when H^+ ions and OH^- ions react to form water?

A condensation

B ionisation

C neutralisation

D precipitation

20 Which statement about the alkali metals is correct?

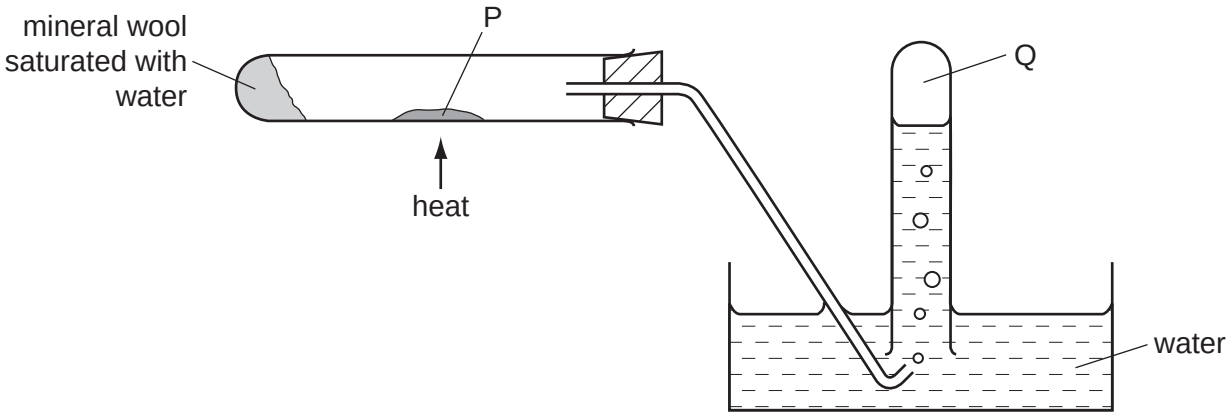
A Their melting points decrease on descending the group.

B Their reactivities decrease on descending the group.

C They form covalent bonds with the halogens.

D They form oxides on reacting with water.

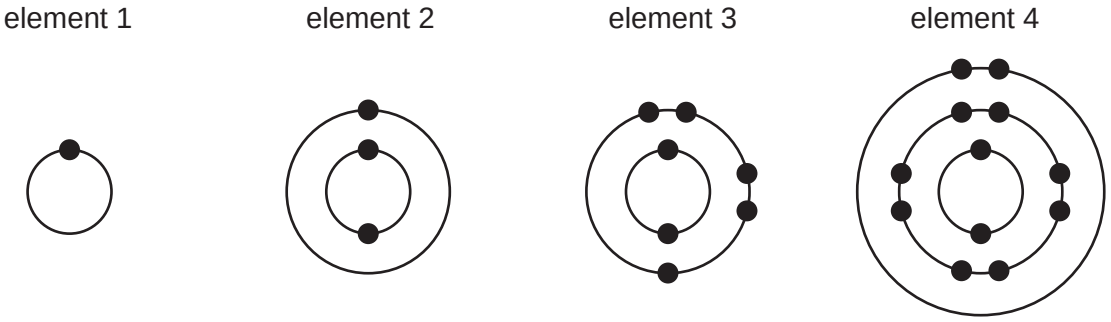
21 In the experiment shown in the diagram, steam is passed over a heated solid P. Gas Q is collected.



What are substances P and Q?

	P	Q
A	copper	hydrogen
B	lead	oxygen
C	silver	oxygen
D	zinc	hydrogen

22 The diagrams show the electronic structures of four elements.



Which two elements are metals?

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

23 Which substance is added to a blast furnace to remove impurities from iron ore?

A carbon

B limestone

C sand

D slag

24 Which pollutant is correctly linked to its source?

	pollutant	source
A	carbon monoxide	internal combustion engine
B	methane	volcanoes
C	nitrogen oxide	bacterial decay
D	sulphur dioxide	lightning activity

25 Which statement about the manufacture of ammonia by the Haber Process is correct?

A The reactants and product are compounds.

B The reactants and product are elements.

C The reactants and product are gases.

D The reactants are both obtained from the air.

26 Bitumen is obtained from crude oil.

What is it used for?

A as fuel for aircraft

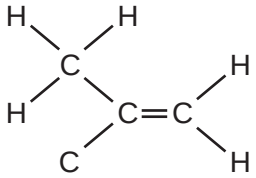
B as fuel for oil stoves

C for making polishes

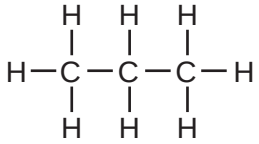
D for making roads

27 Which compound decolourises aqueous bromine?

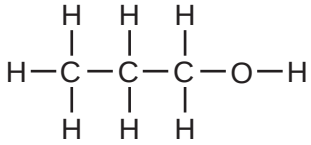
A



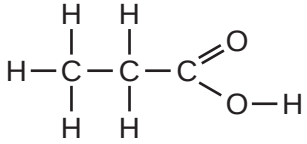
B



C



D



28 Which cell structure contains the light-absorbing pigments in plants?

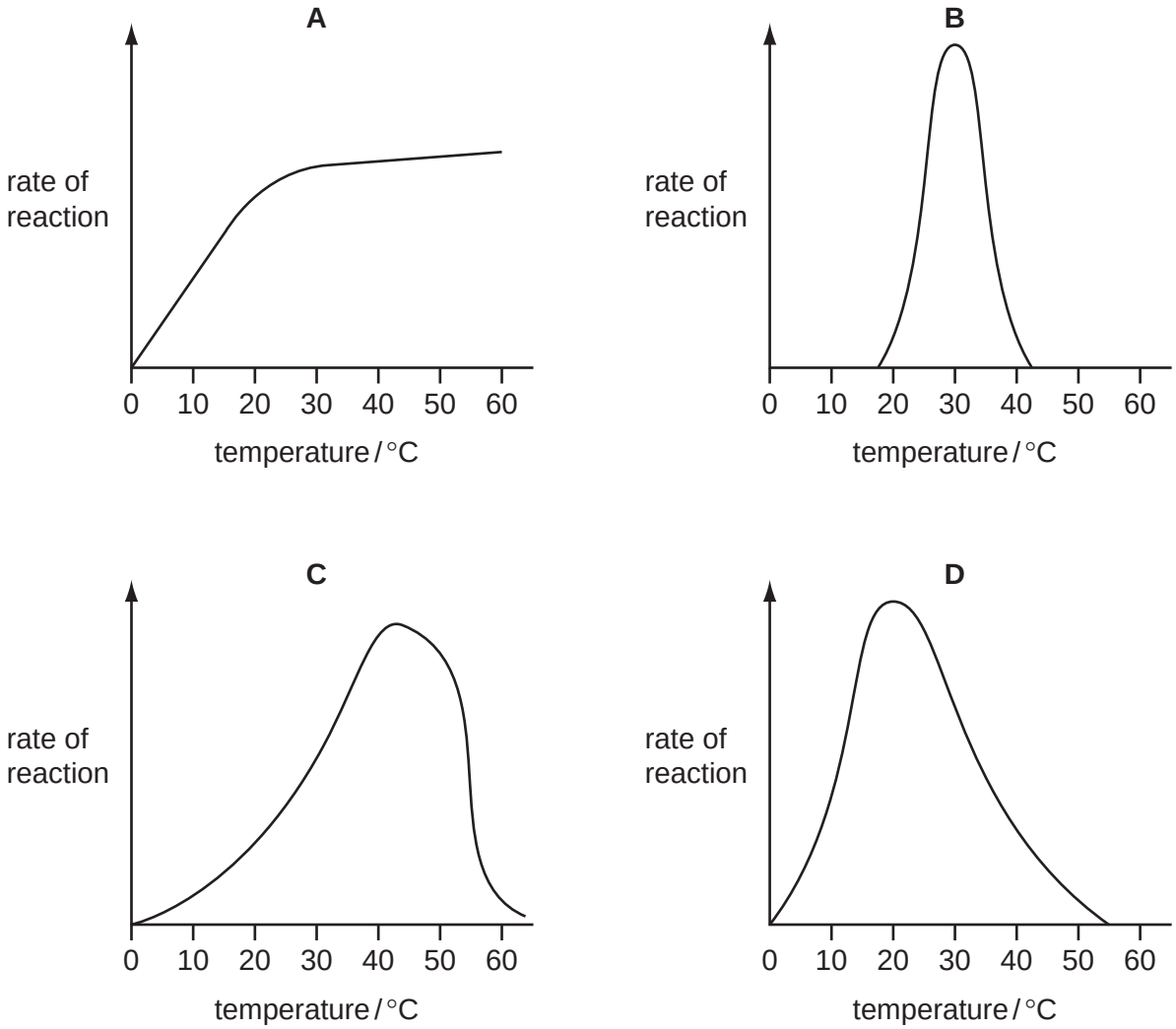
A chloroplast

B cytoplasm

C nucleus

D vacuole

29 Which graph shows the effect of temperature on enzyme-controlled reactions?



30 How does most carbon dioxide reach the photosynthesising cells of a leaf?

A through the cuticle

B through the epidermis

C through the stomata

D through the xylem

31 Which part of the alimentary canal is most acidic?

A colon

B ileum

C mouth

D stomach

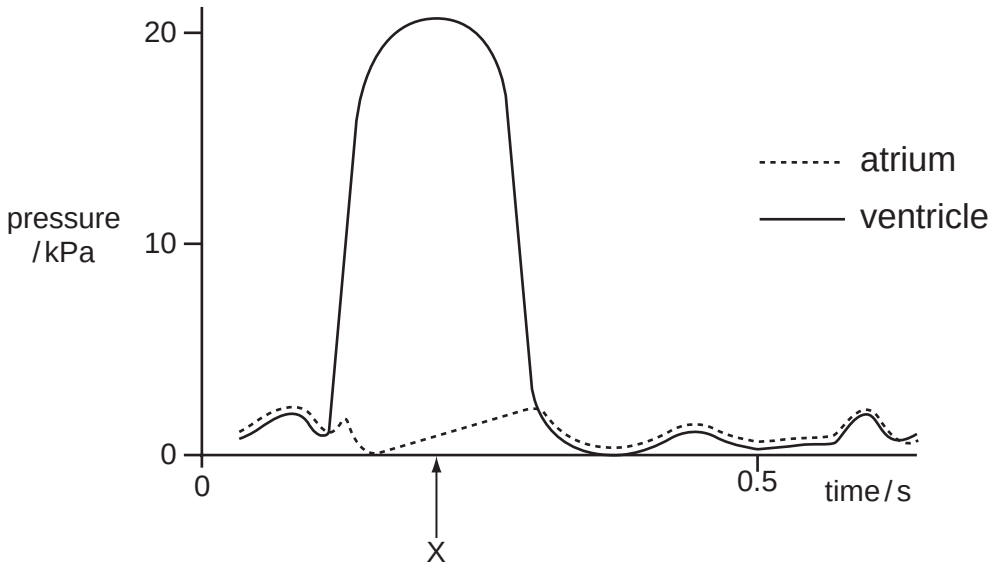
32 Four similar leafy shoots are exposed to different conditions. The rates of water uptake and the rates of water loss are measured.

The results are shown in the table.

Which shoot is most likely to wilt?

	water uptake / mm^3 per min	water loss / mm^3 per min
A	10	12
B	10	8
C	5	5
D	5	2

33 The graph shows pressure changes in the left atrium and in the left ventricle during one heartbeat.



What is the state of the valves at time X?

	bicuspid valve	semi-lunar valve (in aorta)
A	closed	closed
B	closed	open
C	open	closed
D	open	open

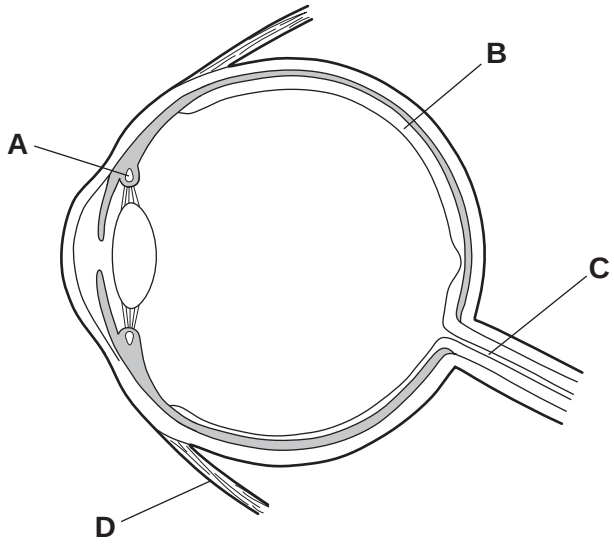
34 The table shows the percentage composition of four samples of air.

Which sample could have been breathed out by a person after vigorous exercise?

	oxygen	carbon dioxide	water vapour
A	16	0.3	saturated
B	16	4	saturated
C	21	0.03	trace
D	21	3	trace

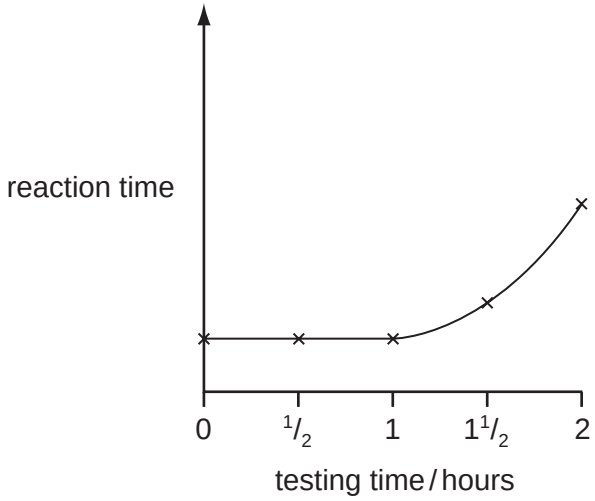
35 The diagram shows a section through an eye.

Which part helps to focus an image on the retina?



36 An experiment was carried out in which the reaction time for a person to respond to seeing a light was measured. Every half hour the person was given an alcoholic drink and the test was repeated.

The results over two hours are shown in the diagram below.



Which deduction can be made from the experiment?

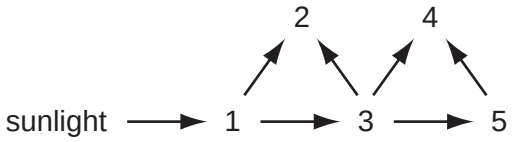
A Alcoholic drinks make the person react more slowly.

B Mental activities are stimulated by small quantities of alcohol.

C The alcohol content of the blood rises rapidly after 1 hour.

D The person reacts more quickly as a result of practice.

37 The diagram shows energy flow in a food web.



Which number represents an organism that eats both plants and animals?

A 2 **B** 3 **C** 4 **D** 5

38 What increases the risk of famine?

A decreased air pollution

B decreased population size

C increased carbon dioxide concentration in the air

D increased soil erosion

39 Which statement is true of asexual reproduction in plants?

A Insects are needed to transfer pollen.

B New plants grow from seeds.

C Offspring are genetically identical to their parents.

D Two types of gametes are involved.

40 What is the path taken by sperm cells during ejaculation from the male reproductive system?

A sperm duct → testis → urethra

B sperm duct → urethra → testis

C testis → sperm duct → urethra

D testis → urethra → sperm duct

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DATA SHEET
The Periodic Table of the Elements

	Group																	
	I	II									III	IV	V	VI	VII	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 **X** b	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.).