CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE 5130/01

Paper 1 Multiple Choice

October/November 2003

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 20.

This document consists of **17** printed pages and **3** blank pages.

MML 4159 9/02 S46438/2

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 A body falls from rest, through the air, and reaches terminal velocity.

How can the acceleration of the body during its fall be described?

A constant at 0 m / s^2

B constant at 10 m / s^2

C decreases from 10 m / s^2 to 0 m / s^2

D increases from 0 m / s^2 to 10 m / s^2

2 A mass resists changes to its motion.

Which property of the mass is responsible for this resistance?

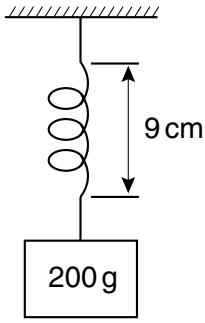
A density

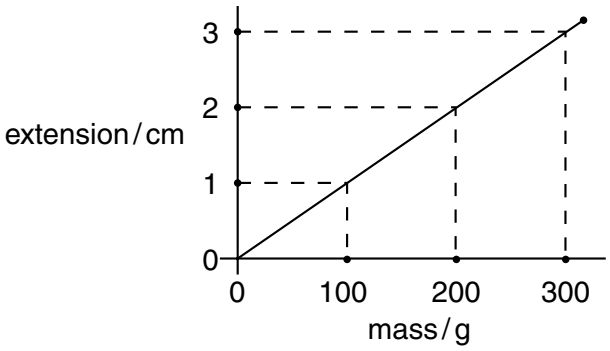
B gravitational potential energy

C inertia

D kinetic energy

3 The diagrams show a spring having a length of 9 cm when loaded with a 200 g mass, and the extension-mass graph for the spring.

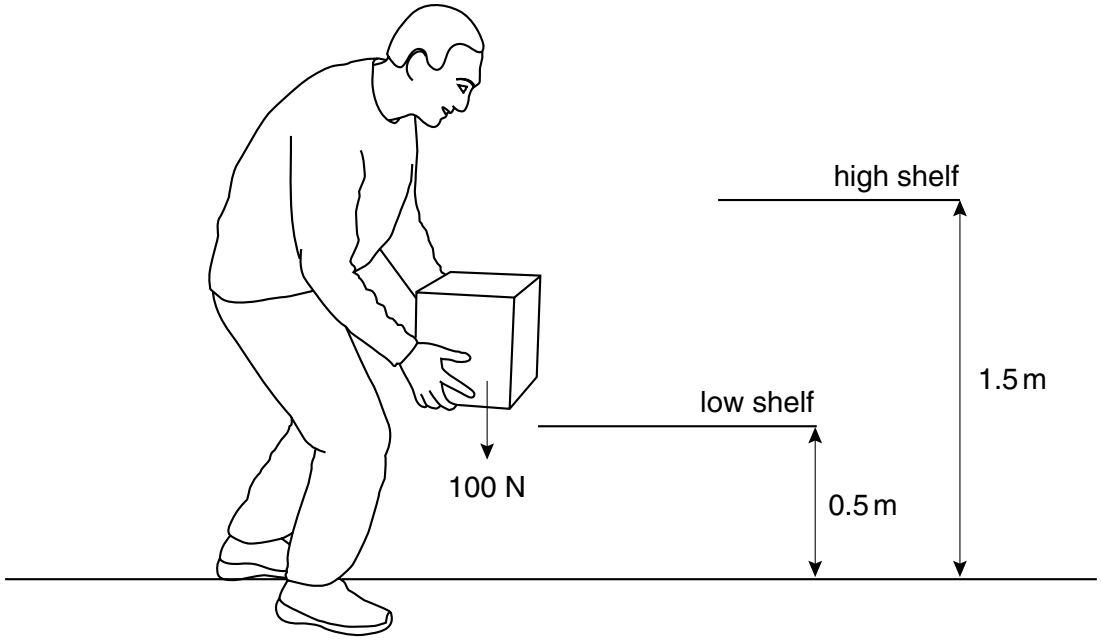




What is the length of the spring after the 200 g mass has been removed?

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

4 The diagram shows a person lifting a box of weight 100 N from a low shelf to a high shelf.



How much work is done by the person?

A 50 J

B 100 J

C 150 J

D 200 J

5 The heat passes from the hot water in a metal radiator through the metal and then spreads around the room.

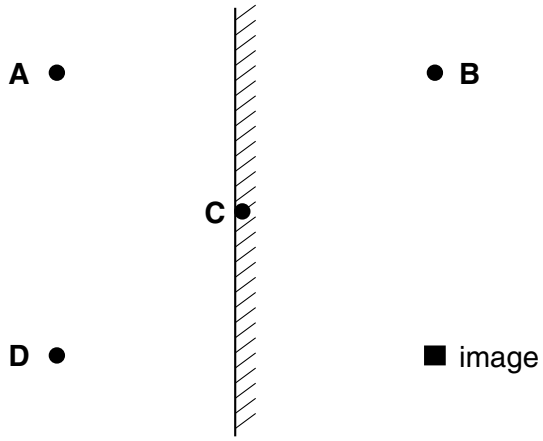
What are the main mechanisms by which the heat is transferred through the radiator and then spread around the room?

	through the metal radiator	around the room
A	conduction	conduction
B	conduction	convection
C	radiation	conduction
D	radiation	convection

[Turn over

6 The diagram shows a plane mirror and the position of an image.

Where must the object be placed to form this image?



7 The table shows how the speed of sound varies with substances of different densities.

substance	speed of sound in substance m / s	density of substance kg / m^3
air (gas)	330	1.29
oxygen (gas)	320	1.43
aluminium (solid)	5100	2710
iron (solid)	5000	7870
lead (solid)	1200	11 300

Which conclusion about the speed of sound can be drawn from this information?

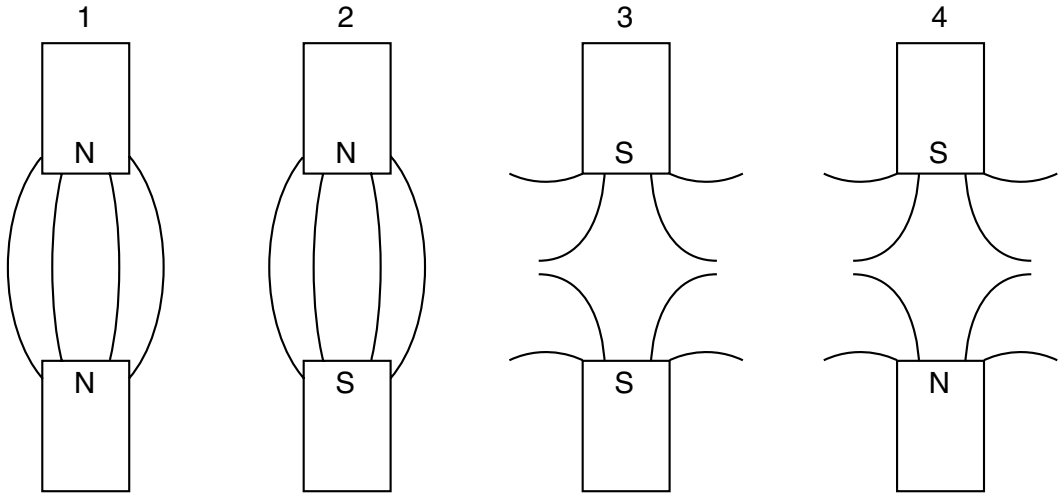
A The speed increases as the density of the substance increases.

B The speed is greater in less dense substances.

C The speed is greater in solids than in gases.

D The speed is greatest in the densest solid.

8 The diagrams show the suggested field lines between the poles of two magnets.



Which are the correct patterns?

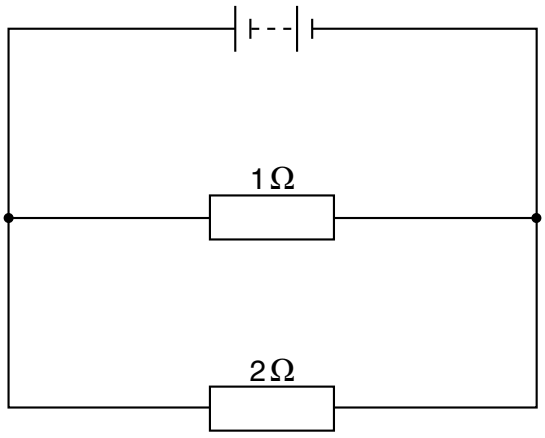
A 1 and 2 **B** 2 and 3 **C** 3 and 4 **D** 4 and 1

9 Electric current is defined as a rate of flow of charge and is measured in amperes, A.

How can the unit of current, the ampere, also be written?

A Cm **B** C/m **C** Cs **D** C/s

10 The diagram shows two resistors in parallel with a battery.



What is the effective resistance of the two resistors?

A 0.67 Ω **B** 1.0 Ω **C** 1.5 Ω **D** 3.0 Ω

[Turn over

11 In a simple d.c. motor, the direction of the current is reversed every half-revolution to keep the motor turning in the same direction.

Which part of the motor does this?

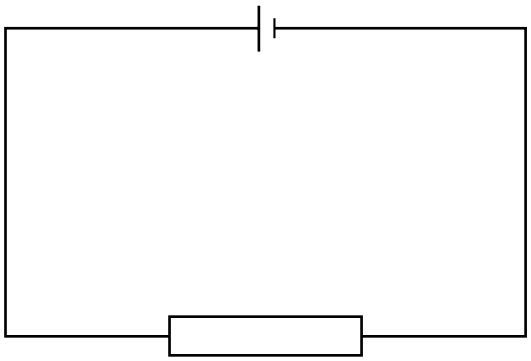
A brushes

B coil

C commutator

D poles

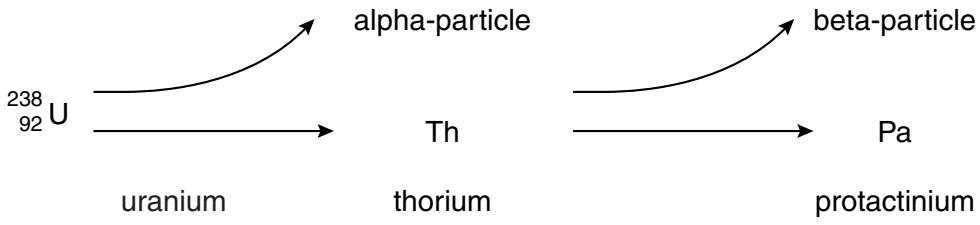
12 An electrical circuit consists of a cell connected to a resistor.



What are the correct directions of the electron flow and of the conventional current flow through the resistor?

	electron flow	conventional current flow
A	left to right	left to right
B	left to right	right to left
C	right to left	right to left
D	right to left	left to right

13 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 95 **B** 91 **C** 90 **D** 89

14 The neutral atoms of all isotopes of the same element contain the same numbers of

A electrons and protons.

B electrons and neutrons.

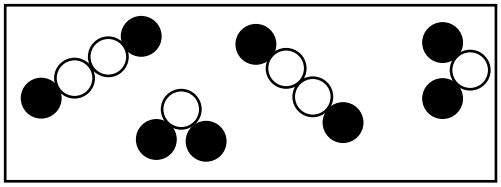
C neutrons.

D neutrons and protons.

15 ○ and ● represent atoms of different elements.

Which diagram shows a mixture of an element and a compound.

A



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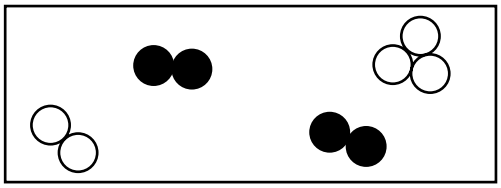
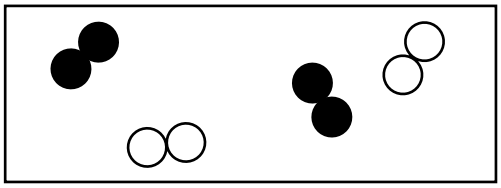


C



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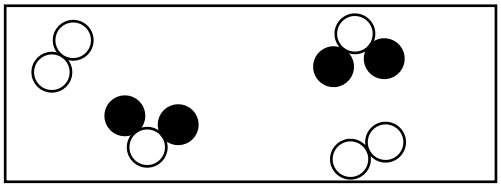
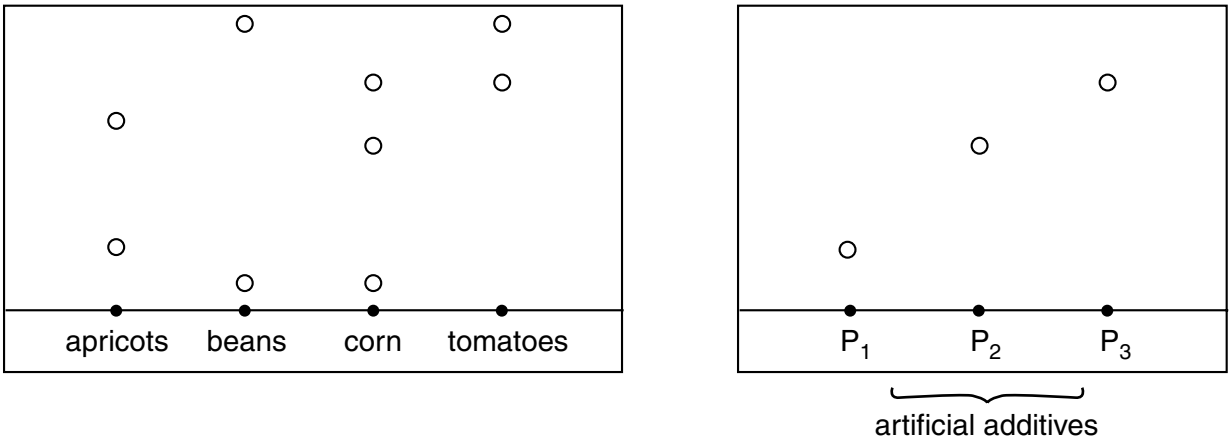


16 Samples of tinned apricots, beans, corn and tomatoes were tested for additives using chromatography. The chromatograms were compared with those of three artificial additives, P_1, P_2 and P_3.

The results were as follows.



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

A apricots

B beans

C corn

D tomatoes

17 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	40
B	38	52	38
C	38	52	40
D	40	50	38

18 Hydrogen molecules each contain a single covalent bond.

How is this covalent bond formed?

A A single electron from each hydrogen atom is shared between the two hydrogen atoms.

B A single electron is shared between two hydrogen atoms.

C One hydrogen atom transfers an electron to the other hydrogen atom.

D Two electrons from each hydrogen atom are shared between the two hydrogen atoms.

19 Each of the following substances produces carbon dioxide on complete combustion.

Which one will produce 1.0 mol of carbon dioxide?

A 2.0 mol of graphite, C

B 1.5 mol of propane, C_3H_8

C 1.5 mol of ethene, C_2H_4

D 0.5 mol of ethanol, C_2H_5OH

20 The results of some tests on polluted river water are shown.

reagent added slowly until in excess	first observation	second observation
aqueous sodium hydroxide	white precipitate	precipitate dissolves to give colourless solution
aqueous ammonia	white precipitate	no further change

Which metal ion must be present in the water?

A Al^{3+} **B** Ca^{2+} **C** Fe^{2+} **D** Zn^{2+}

21 Which pair of substances is most suitable for the preparation of copper(II) sulphate?

A aqueous copper(II) nitrate and aqueous sodium sulphate

B copper and dilute sulphuric acid

C copper(II) carbonate and dilute sulphuric acid

D copper(II) oxide and aqueous ammonium sulphate

22 The names and electronic structures of the noble gases are shown.

helium	2
neon	2, 8
argon	2, 8, 8
krypton	2, 8, 18, 8
xenon	2, 8, 18, 18, 8

Why do the noble gases in Group 0 form so few compounds?

A They all have an even number of electrons.

B They all have a stable arrangement of electrons.

C They all have eight electrons in the outer shell.

D They all have two electrons in the first shell.

[Turn over

23 Which statement about the extraction of aluminium from aluminium oxide is true?

A Aluminium is extracted by heating its oxide with carbon.

B Aluminium is extracted using electrolysis and is collected at the anode (positive electrode).

C Aluminium is extracted using platinum electrodes and direct current.

D Molten cryolite is used as a solvent for aluminium oxide.

24 The table shows the boiling points of the elements found in a sample of liquid air.

element	argon	helium	neon	nitrogen	oxygen
boiling point / °C	–186	–269	–246	–196	–183

Which elements would be gaseous at –190 °C

A argon, helium and nitrogen

B argon, nitrogen and oxygen

C helium, neon and nitrogen

D helium, neon and oxygen

25 Which conditions are used for the manufacture of ammonia by the Haber process?

	catalyst used	pressure / at	temperature / °C
A	iron	200	450
B	iron	450	200
C	nickel	200	450
D	nickel	450	200

26 Bitumen is obtained from crude oil. It is used

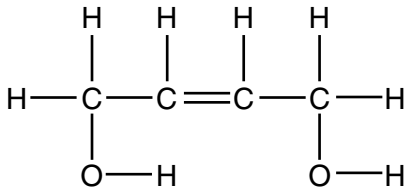
A as aircraft fuel.

B as fuel for oil stoves.

C for making polishes.

D for making roads.

27 The diagram shows the structure of a compound **X**.



How is **X** classified?

A as an acid and as an alcohol

B as an alkene and as an acid

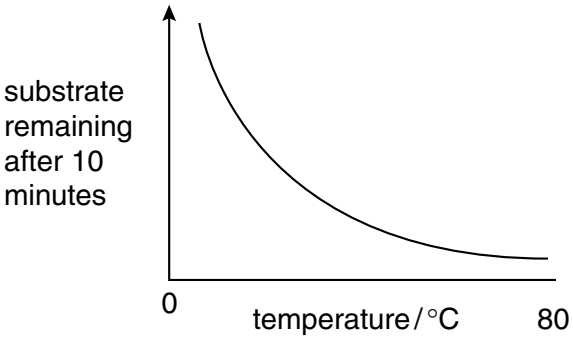
C as an alkene and as an alcohol

D as an alkene and as an ester

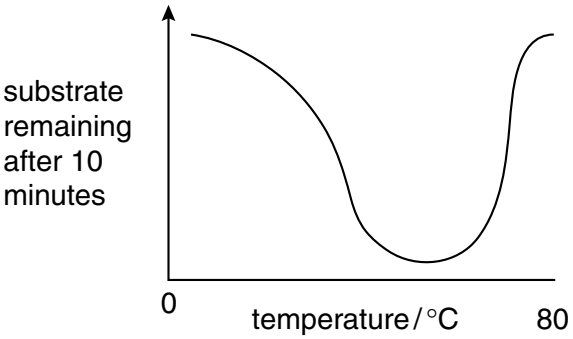
28 The activity of an enzyme can be measured by finding the amount of substrate remaining after 10 minutes. The more active the enzyme, the **less** substrate will remain.

Which graph shows the effect of temperature on enzyme activity?

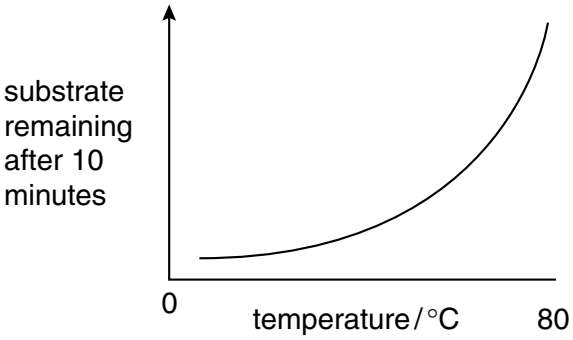
A



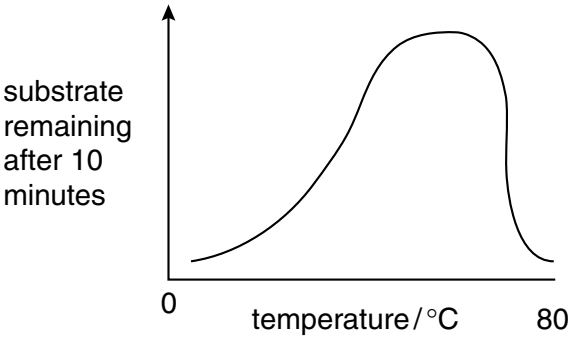
B



C

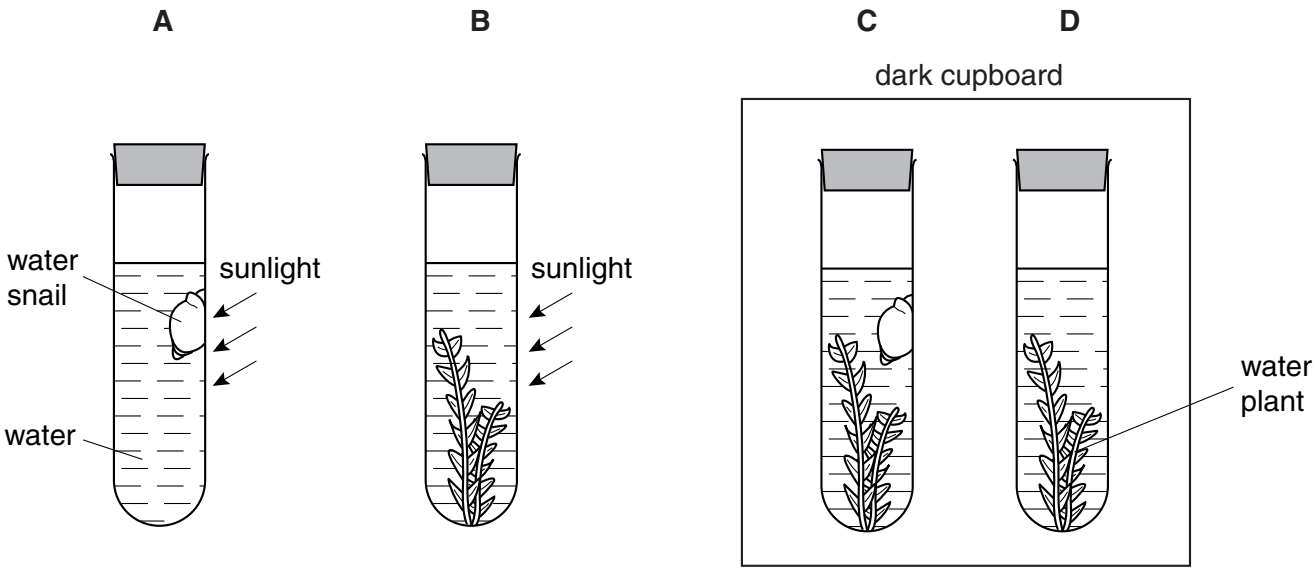


D



29 The investigation shown was set up and left for one hour.

In which test-tube did the concentration of carbon dioxide dissolved in the water **decrease**?



30 The table shows the nutrients in different parts of a meal.

Which food would be most useful in preventing constipation?

	food	energy kJ	protein g	fat g	carbohydrate g	fibre g
A	apple juice	163	0.1	0	9.4	0
B	ripe banana	466	1.5	0.4	27	5
C	salad sandwich	1054	19	7.3	27	6.1
D	toffee bar	458	2.1	3.3	19	1.1

31 Which of the following environmental conditions would cause rapid transpiration?

	air	light	temperature
A	damp	bright	cold
B	damp	dim	warm
C	dry	bright	warm
D	dry	dim	cold

32 What causes the drop in blood pressure as blood passes through the lungs?

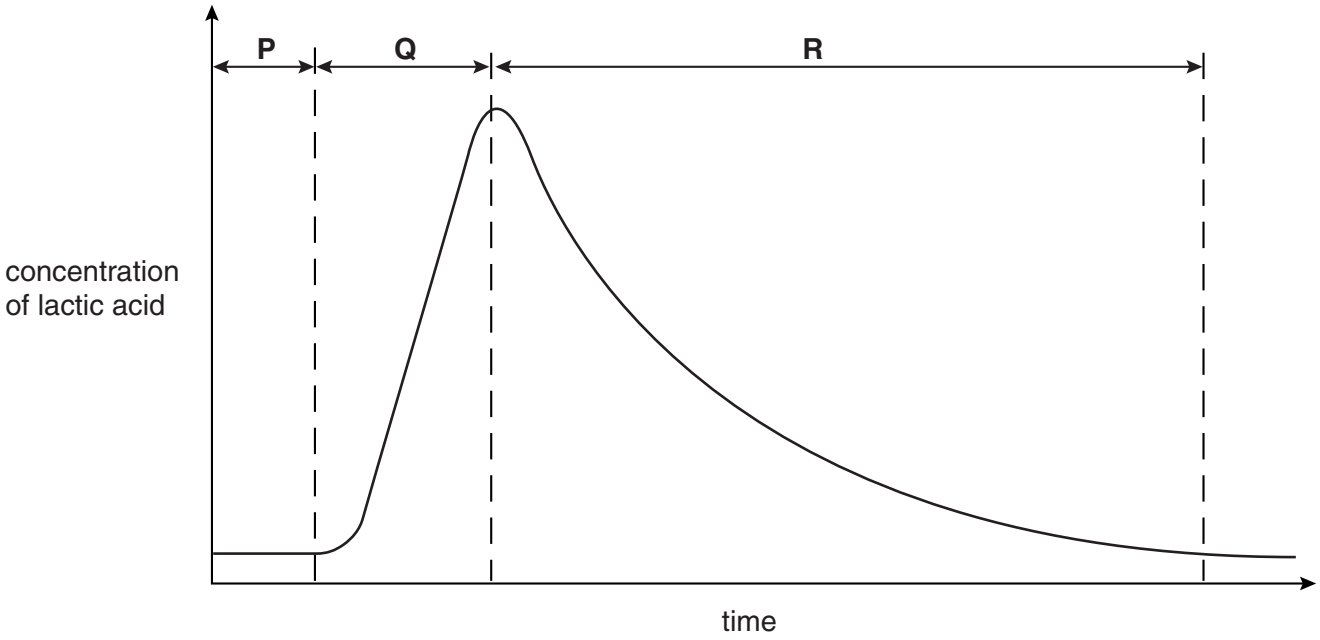
A high air pressure in alveoli

B high blood pressure in left atrium

C muscular contraction of capillary walls

D resistance of capillary walls

33 The graph shows the concentration of lactic acid in the blood of an athlete.



During which period of time was the athlete exercising?

A period **P** only

B period **Q** only

C period **R** only

D periods **P** and **Q**

34 Which waste product, made by the liver, is removed from a patient's blood by a kidney machine?

A carbon dioxide

B salt

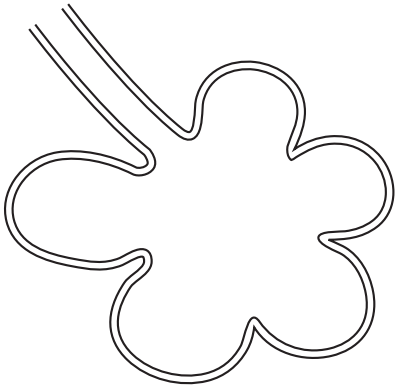
C urea

D urine

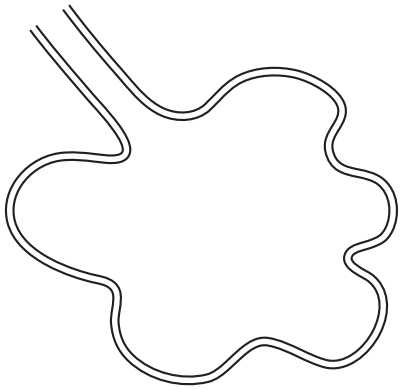
35 In temperature control of the body, which types of neurones carry signals from skin receptors to the brain, and from the brain to sweat glands?

	from skin receptors to the brain	from the brain to sweat glands
A	motor	sensory
B	motor	relay
C	relay	motor
D	sensory	motor

36 The diagrams show the structure of the alveoli in the lungs of a healthy person and in someone suffering from emphysema.



healthy



emphysema

What is the effect of emphysema?

A increased chance of lung cancer

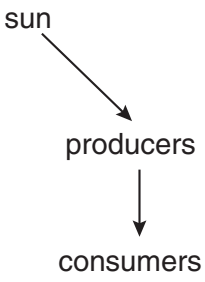
B inflammation of the walls of the airways

C less difficulty in breathing in and out

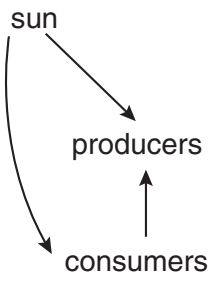
D less efficient gaseous exchange

37 Which diagram shows part of the energy flow in an ecosystem?

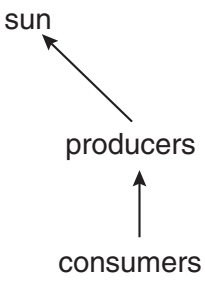
A



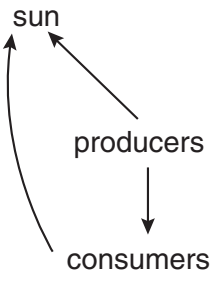
B



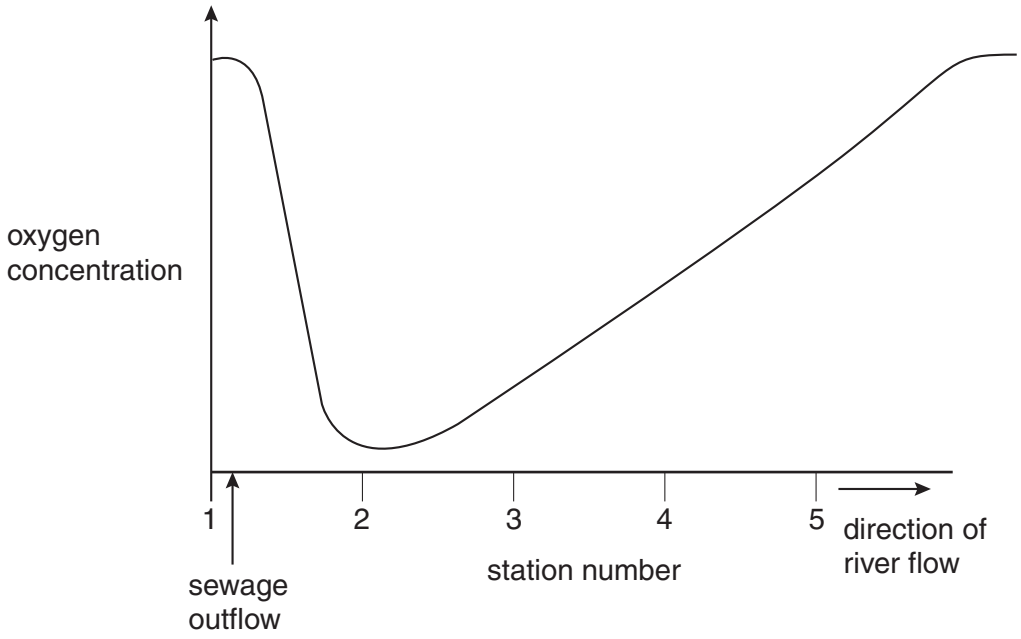
C



D



38 The graph shows the concentration of oxygen in a river, measured at stations 1 to 5, each 100 m apart. There is a sewage outflow just after station 1.



At which stations are the concentrations of organic matter **lowest**?

A 1 and 5

B 2 and 3

C 3 and 4

D 4 and 5

[Turn over

39 Which of the following is essential for seeds to begin germinating?

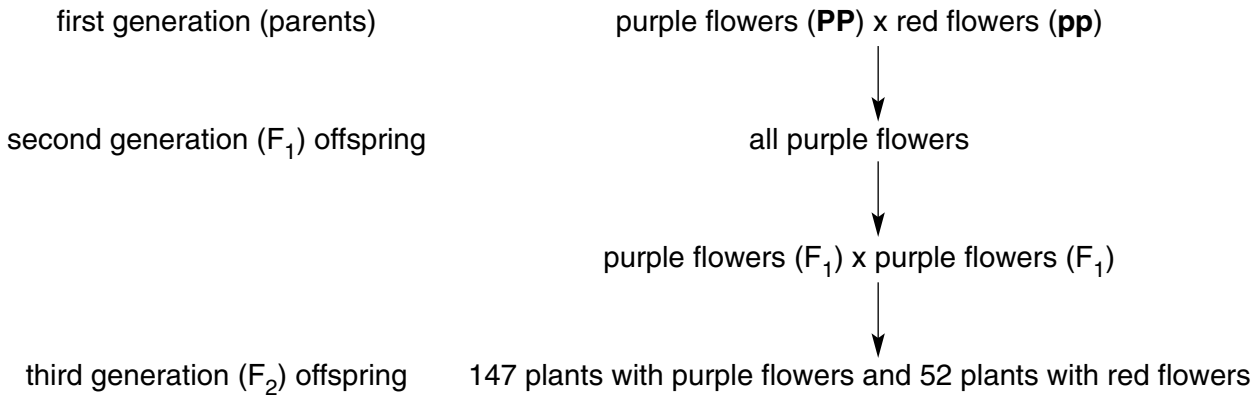
A carbon dioxide

B light

C mineral salts

D oxygen

40 The diagram shows the results of crosses between sweet pea plants. **P** represents the allele for purple flowers and **p** represents the allele for red flowers.



What are the genotypes of the third generation (F_2) offspring?

A all **Pp**

B some **PP** and some **pp** only

C some **Pp** and some **pp** only

D some **PP**, some **Pp** and some **pp**

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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.).