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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE **5129/01**

Paper 1 Multiple Choice

May/June 2005

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.

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1 A plumber needs to measure the internal diameter of a water tap as accurately as po

Which instrument should be used?

A measuring tape

B metre rule

C micrometer

D vernier calipers

2 Which expression can be used to calculate force?

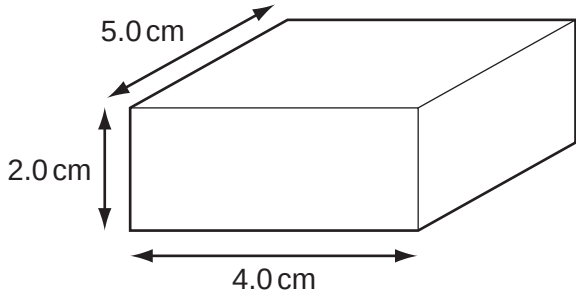
A mass = force / acceleration

B mass = force x acceleration

C power = force x time

D work = force / distance

3 The diagram shows a solid with dimensions 5 cm x 4 cm x 2 cm. It has a mass of 100 g.



What is the density of the solid?

A 0.40 g / cm^3 **B** 2.5 g / cm^3 **C** 5.0 g / cm^3 **D** 10 g / cm^3

4 The power output of a lamp is 6 W.

How much energy does the lamp give out in 2 minutes?

A 3 J **B** 12 J **C** 120 J **D** 720 J

5 A copper plate is heated in air to 100 °C and then allowed to cool.

It cools by emitting

A beta-particles.

B gamma-rays.

C infra-red radiation.

D ultraviolet radiation.

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6 How can liquid-in-glass thermometers be made to respond quickly to changes in temp

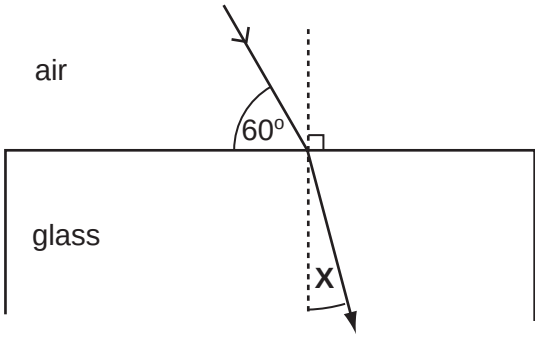
A Make the bore narrower.

B Make the bulb from thinner glass.

C Make the stem longer.

D Make the stem from thicker glass.

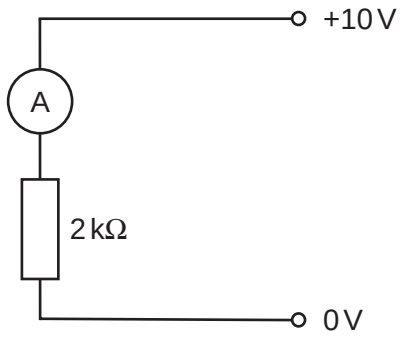
7 A ray of light passes into a parallel-sided glass block of refractive index 1.5 .



What is the value of the angle marked **X**?

A 19.5° **B** 25° **C** 35° **D** 48.5°

8 An ammeter is connected in the circuit as shown.



Which current flows through the ammeter?

A 5 mA **B** 20 mA **C** 0.2 A **D** 5 A

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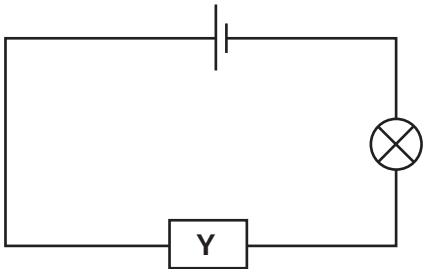
9 In the circuit shown, component **Y** can gradually change the brightness of the lamp.



What is component **Y**?

A a battery

B a resistor

C a switch

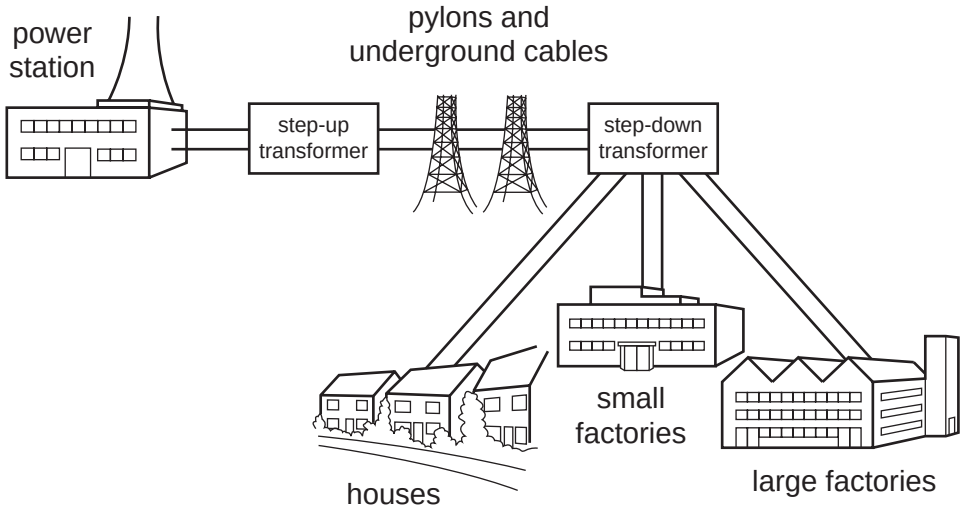
D a variable resistor

10 A portable tape-recorder is rated at 12 W, 2A.

How many 1.5 V batteries are needed in the tape-recorder?

A 3 **B** 4 **C** 6 **D** 8

11 Transformers are used in power distribution networks as shown.



What does the step-up transformer do?

A It makes the input voltage higher than the output voltage.

B It makes the output current higher than the input current.

C It makes the output voltage higher than the input voltage.

D It makes the output voltage the same as the input voltage.

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12 What are the numbers of neutrons, protons and electrons in a neutral atom of $^{235}_{92}U$?

	number of neutrons	number of protons	number of electrons
A	92	143	143
B	92	235	235
C	143	92	92
D	235	92	92

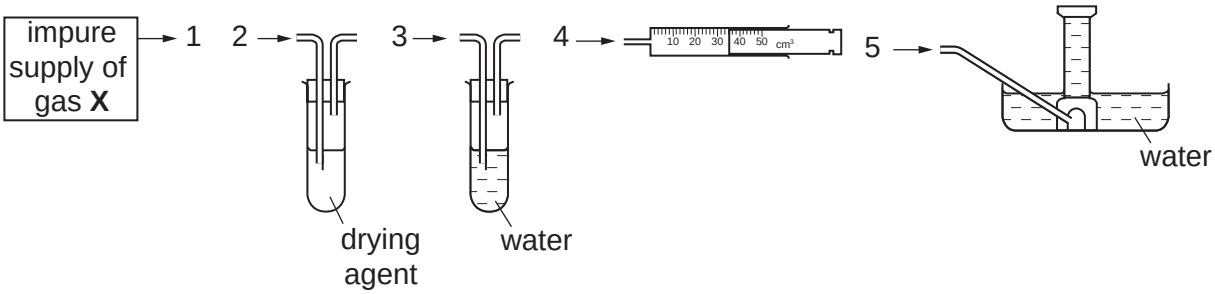
13 A radioactive material gives a count rate of 8000 counts per minute.

After twenty days, it gives a count rate of 500 counts per minute.

What is the half-life of the material?

A 4 days **B** 5 days **C** 20 days **D** 80 days

14 A gas **X** is insoluble in water and less dense than air. An impure supply of **X** contains water vapour and a water-soluble impurity.



In which order should the pieces of apparatus be joined together to collect a pure, dry sample of **X**?

A 1, 2, 3, 4 **B** 1, 2, 3, 5 **C** 1, 3, 2, 5 **D** 1, 3, 2, 4

15 What is the definition of nucleon (mass) number?

A the mass in grams of an atom

B the number of electrons in an atom

C the number of nuclei in a molecule

D the total number of protons and neutrons in an atom

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16 The table gives the arrangement of the electrons in four elements.

Which element forms an ionic compound with chlorine?

	arrangement of electrons
A	2.1
B	2.4
C	2.7
D	2.8

17 The table gives some properties of four substances.

Which one of the substances could contain covalent bonding?

substance	melting point / °C	boiling point / °C	electrical conductivity when liquid	electrical conductivity in aqueous solution
A	808	1465	✓	✓
B	–114	78	✗	✗
C	64	748	✓	✓
D	327	1730	✓	✗

18 The equation shows the reaction between sodium and water. The equation is not balanced.

$$x\,Na + y\,H_2O \rightarrow 2NaOH + H_2$$

What are the values of *x* and *y*?

	x	*y*
A	1	1
B	1	2
C	2	1
D	2	2

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19 The table shows the pH value of 5 soil samples.

soil sample	pH
P	8.0
Q	7.5
R	7.0
S	6.5
T	6.0

Cabbages grow best in alkaline soil.

In which of the soil samples should cabbage grow well?

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

20 Astatine (At) is in Group VII of the Periodic Table.

Which of the following is a property of astatine?

A It forms a basic oxide.

B It is a good conductor of electricity.

C It is displaced by chlorine from aqueous potassium astatide.

D It displaces iodine from aqueous potassium iodide.

21 Which two properties are typical of most metals?

	property 1	property 2
A	they are insoluble in water	they react with alkalis
B	they are soluble in water	they react with acids
C	they are soluble in water	their oxides react with alkalis
D	they can be drawn into wires	their oxides react with acids

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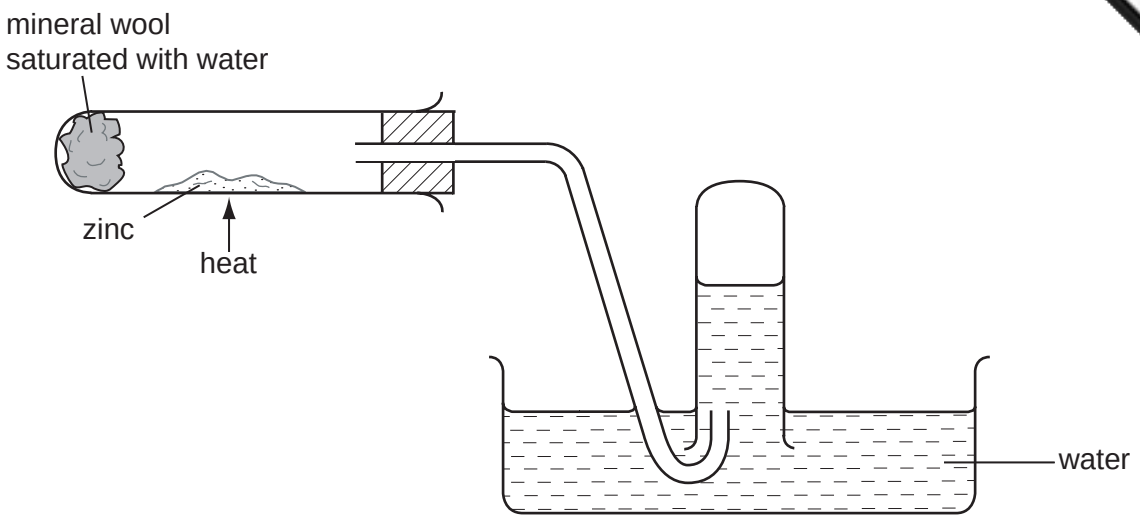
22 The apparatus is used to show the reaction between zinc and steam.



Which equation represents the reaction taking place?

A $Zn + H_2O \rightarrow ZnO + H_2$

B $Zn + 2H_2O \rightarrow Zn(OH)_2 + H_2$

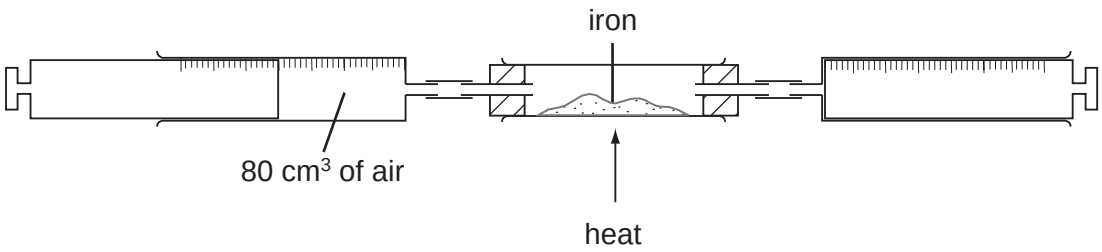
C $Zn + 4H_2O \rightarrow Zn(OH)_2 + 3H_2 + O_2$

D $2Zn + 3H_2O \rightarrow ZnO + Zn(OH)_2 + 2H_2$

23 Which conditions are used in the Haber process for the manufacture of ammonia?

	pressure	temperature
A	high	below 1000 °C
B	high	above 1000 °C
C	low	below 1000 °C
D	low	above 1000 °C

24 An 80 cm^3 sample of air is trapped in a syringe. The air is slowly passed over heated iron in a tube until there is no further decrease in volume.



When cooled to the original temperature, which volume of gas remains?

A 80 cm^3 **B** 64 cm^3 **C** 20 cm^3 **D** 16 cm^3

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25 In oil refineries, crude oil is split up into different fractions. The table shows a [illegible] fractions together with their boiling points.

	fraction	boiling point
runny	gas	below 20 °C
↓	petrol	40-75 °C
	diesel	175-250 °C
	engine oil	250-300 °C
thick	tar	over 300 °C

Which statement is correct?

A All fractions have roughly the same boiling point.

B All fractions are as runny as each other.

C Boiling points get higher as fractions get thicker.

D Runny fractions have higher boiling points than thick fractions.

26 What can be used to distinguish between ethane and ethene?

A a lighted splint

B aqueous bromine

C limewater

D litmus solution

27 Vinegar is made by the reaction of ethanol with air.

Which gas in air takes part in this reaction?

A carbon dioxide

B nitrogen

C oxygen

D water vapour

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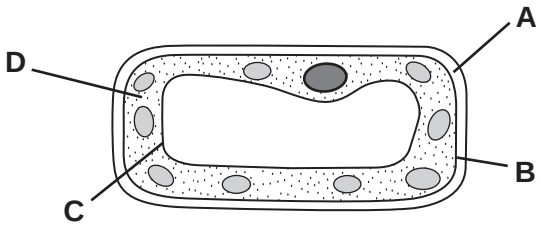
28 The diagram shows a plant cell.

Which structure controls the passage of substances into and out of the cell?



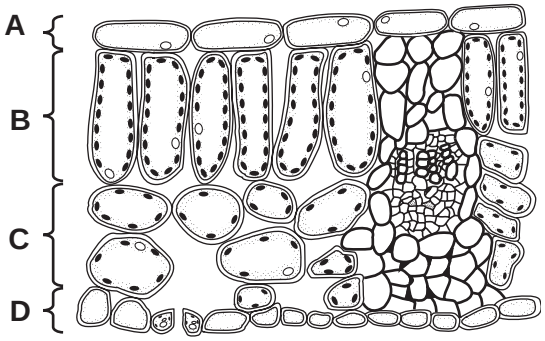
29 The table shows the results of an experiment to investigate the effect of temperature on amylase activity. The amount of sugar produced from four identical starch solutions is measured at four different temperatures.

At which temperature is amylase most active?

	temperature / °C	amount of sugar / units
A	15	19
B	25	38
C	35	42
D	45	37

30 The diagram shows the arrangement of cells in the leaf of a green plant.

In which region do the cells contain the greatest number of chloroplasts?



31 What is the function of the gall bladder?

A absorption of fat

B digestion of fat

C production of bile

D storage of bile

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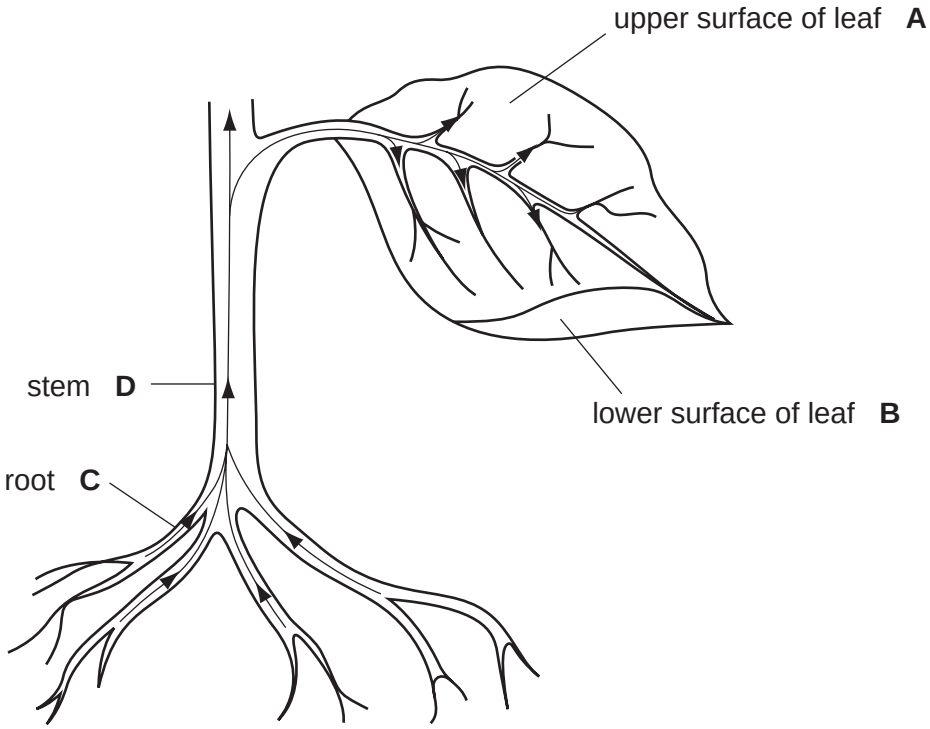
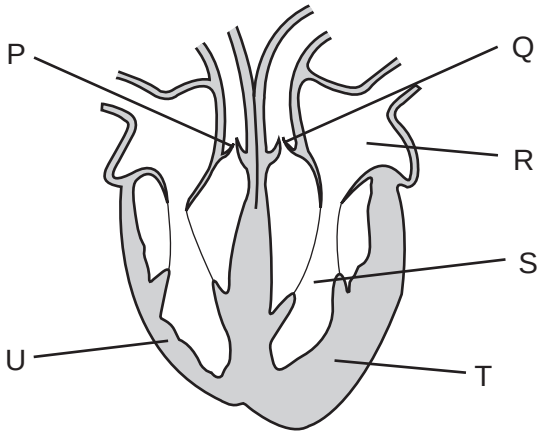
32 The diagram shows the pathway of water through a flowering plant.

Where does most transpiration take place?



33 The diagram shows a section through the human heart.



Which feature suggests that the blood leaves the heart at different pressures, going to the lungs and to the body?

A chambers R and S have different volumes

B the walls of the atria are thinner than the walls of the ventricles

C valve P is stronger than valve Q

D wall T is more muscular than wall U

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34 Which substance builds up in a muscle as a result of anaerobic respiration?

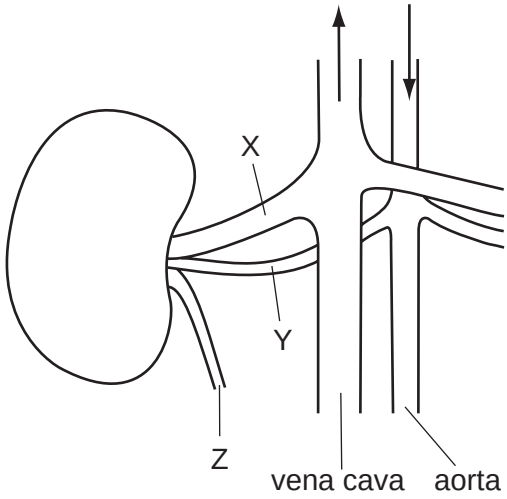
A carbon dioxide

B ethanol

C lactic acid

D oxygen

35 The diagram shows the structures associated with a human kidney.



What are the relative concentrations of urea in X, Y and Z?

	X	Y	Z
A	higher	lower	higher
B	higher	lower	lower
C	lower	higher	higher
D	lower	higher	lower

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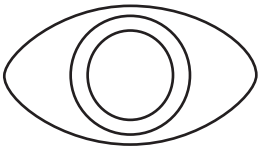
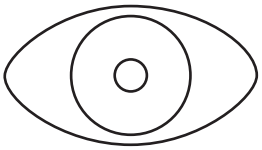
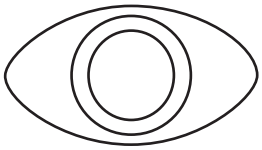
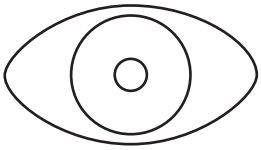
36 What is the appearance of the eye, and the state of the circular muscles of the iris, w[illegible] an object in **bright** light?

	front view of eye	state of circular muscles of iris
A		contracted
B		contracted
C		relaxed
D		relaxed

37 Which of these drugs can be both addictive and depressant?

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

key

✓ = yes

✗ = no

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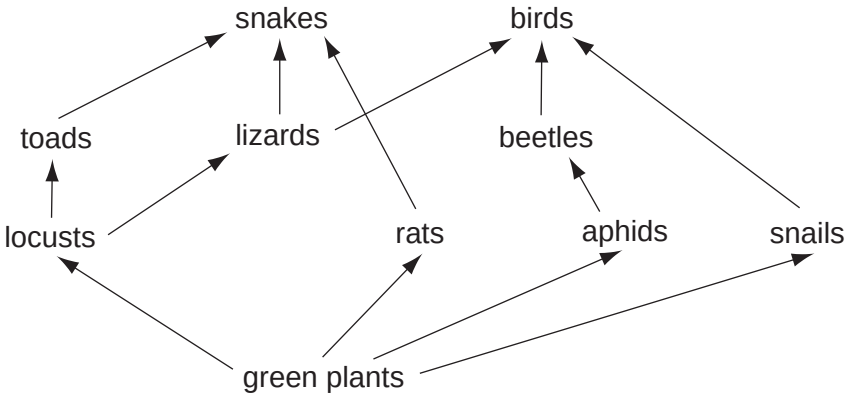
38 The diagram shows a food web in woodland.



In this food web a beetle is a

A carnivore.

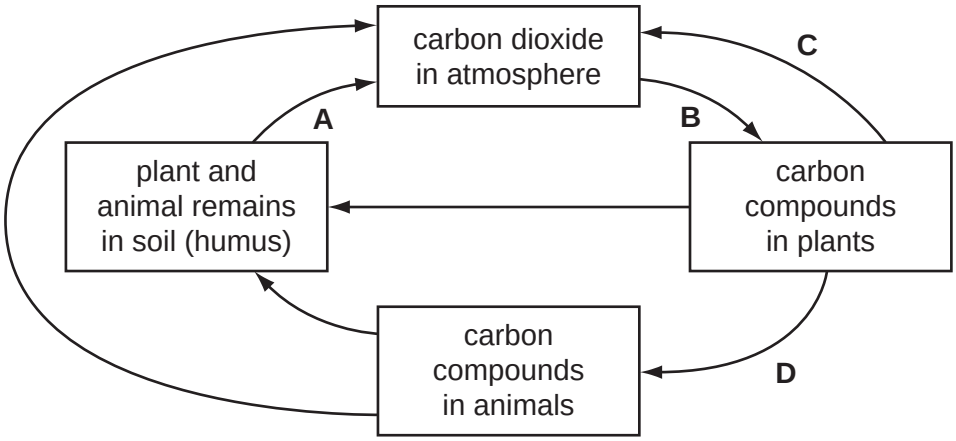
B decomposer.

C herbivore.

D producer.

39 The diagram shows part of the carbon cycle.

Which arrow represents the process of photosynthesis?



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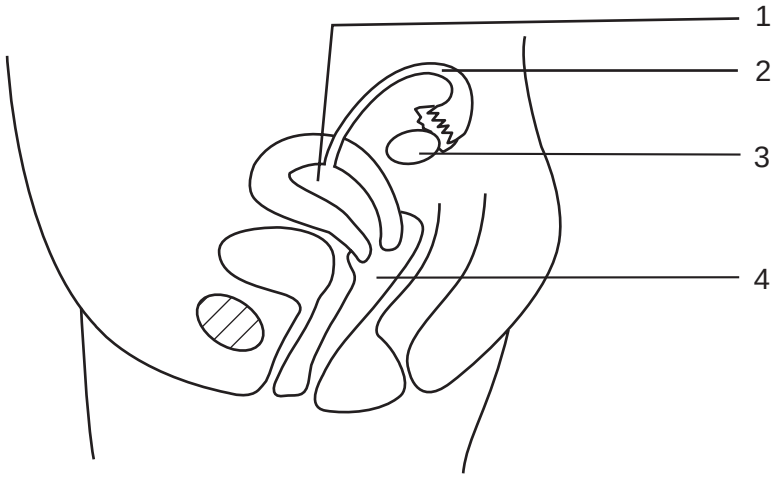
40 The diagram shows a side view of the female reproductive system.



In which region are sperms released during intercourse and where does the fusion of sperm and egg usually take place?

	sperms released	fusion of egg and sperm
A	1	2
B	1	3
C	4	2
D	4	3

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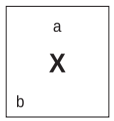
DATA SHEET
The Periodic Table of the Elements

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 = 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.).

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