

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.

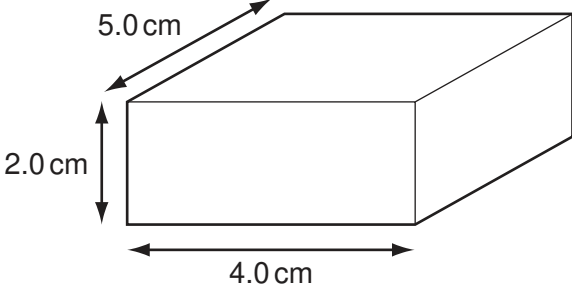
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.

Any rough working should be done in this booklet.

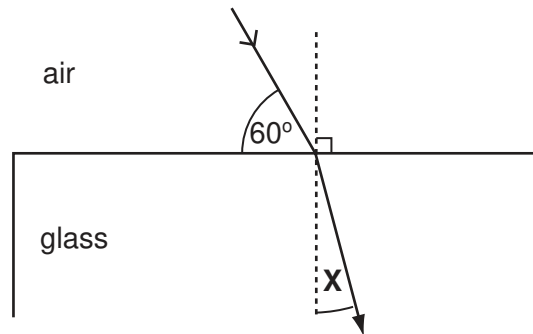
A copy of the Periodic Table is printed on page 16.

This document consists of **16** printed pages.



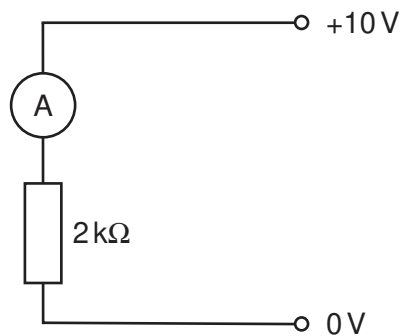
- 1 A plumber needs to measure the internal diameter of a water tap as accurately as possible.
Which instrument should be used?
- A measuring tape
 - B metre rule
 - C micrometer
 - D vernier calipers
- 2 Which expression can be used to calculate force?
- A $\text{mass} = \text{force} / \text{acceleration}$
 - B $\text{mass} = \text{force} \times \text{acceleration}$
 - C $\text{power} = \text{force} \times \text{time}$
 - D $\text{work} = \text{force} / \text{distance}$
- 3 The diagram shows a solid with dimensions 5 cm x 4 cm x 2 cm. It has a mass of 100g.
- 
- 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 6W.
How much energy does the lamp give out in 2 minutes?
- A 3J
 - B 12J
 - C 120J
 - D 720J
- 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.

- 6 How can liquid-in-glass thermometers be made to respond quickly to changes in temperature?
- 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**?

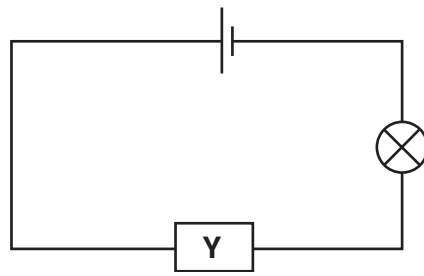
- A 19.5° B 25° C 35° D 48.5°
- 8 An ammeter is connected in the circuit as shown.



Which current flows through the ammeter?

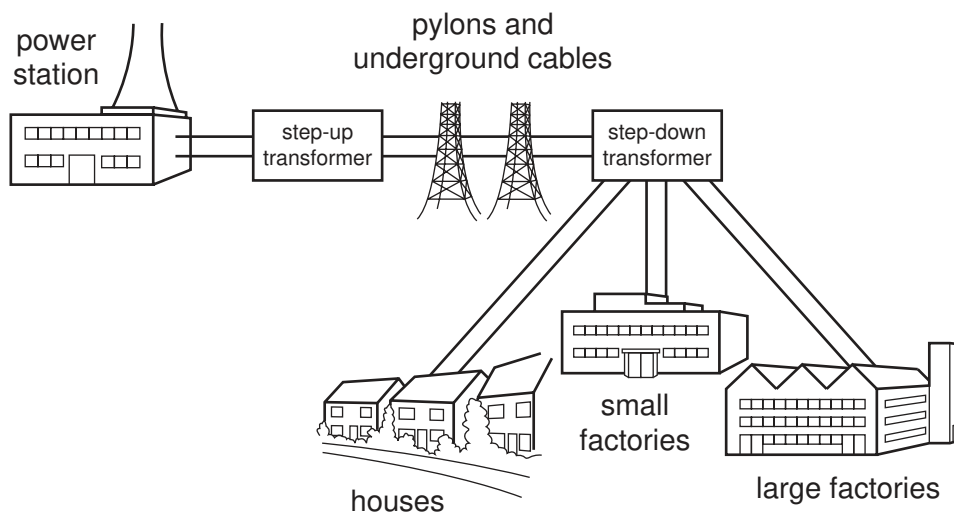
- A 5 mA B 20 mA C 0.2 A D 5 A

- 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 12W, 2A.
How many 1.5V 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.

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

	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

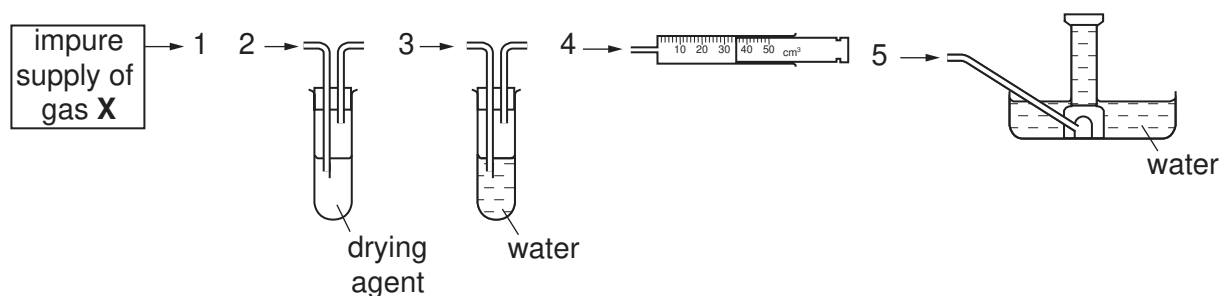
13 A radioactive material gives a count rate of 8000 counts per minute.

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

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

Which element forms an ionic compound with chlorine?

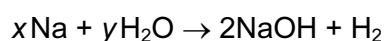
	arrangement of electrons
A	2.1
B	2.4
C	2.7
D	2.8

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	x	x
C	64	748	✓	✓
D	327	1730	✓	x

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



What are the values of x and y ?

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

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.

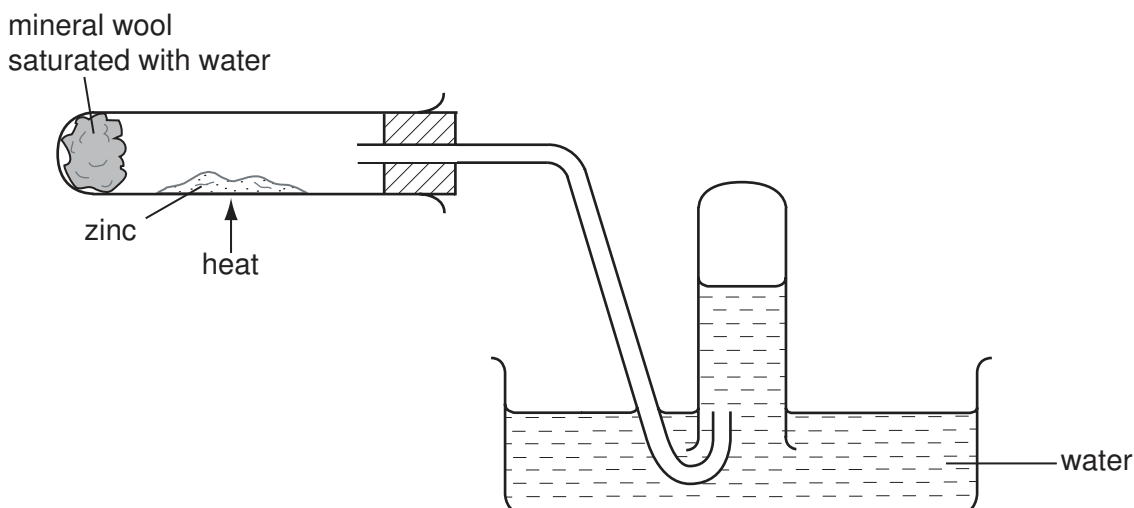
Which of the following is a property of astatine?

- 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

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



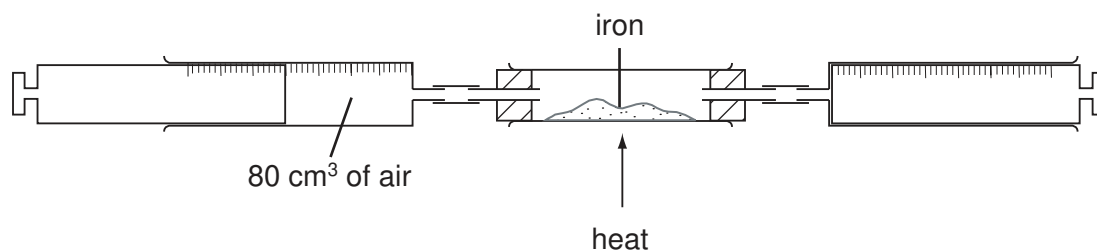
Which equation represents the reaction taking place?

- A** $\text{Zn} + \text{H}_2\text{O} \rightarrow \text{ZnO} + \text{H}_2$
B $\text{Zn} + 2\text{H}_2\text{O} \rightarrow \text{Zn(OH)}_2 + \text{H}_2$
C $\text{Zn} + 4\text{H}_2\text{O} \rightarrow \text{Zn(OH)}_2 + 3\text{H}_2 + \text{O}_2$
D $2\text{Zn} + 3\text{H}_2\text{O} \rightarrow \text{ZnO} + \text{Zn(OH)}_2 + 2\text{H}_2$

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 cm³ 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 cm³ **B** 64 cm³ **C** 20 cm³ **D** 16 cm³

- 25 In oil refineries, crude oil is split up into different fractions. The table shows a few of these fractions together with their boiling points.

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

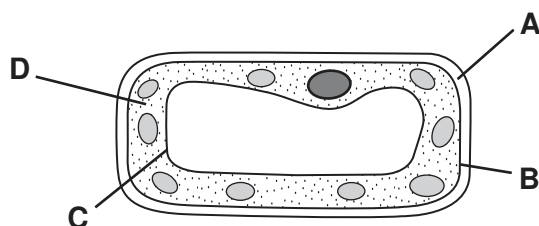
- 27 Vinegar is made by the reaction of ethanol with air.

Which gas in air takes part in this reaction?

- A carbon dioxide
- B nitrogen
- C oxygen
- D water vapour

28 The diagram shows a plant cell.

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



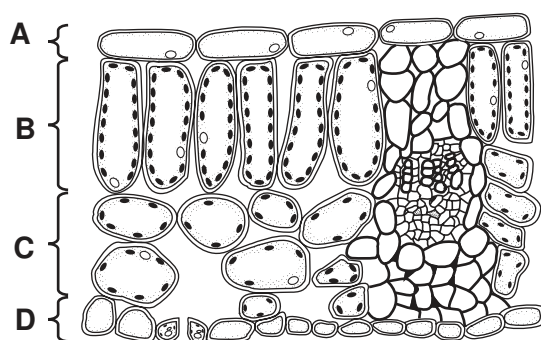
29 The table shows the results of an experiment to investigate the effect of temperature on amylase activity. The amount of sugar produced from four identical starch solutions is measured at four different temperatures.

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?

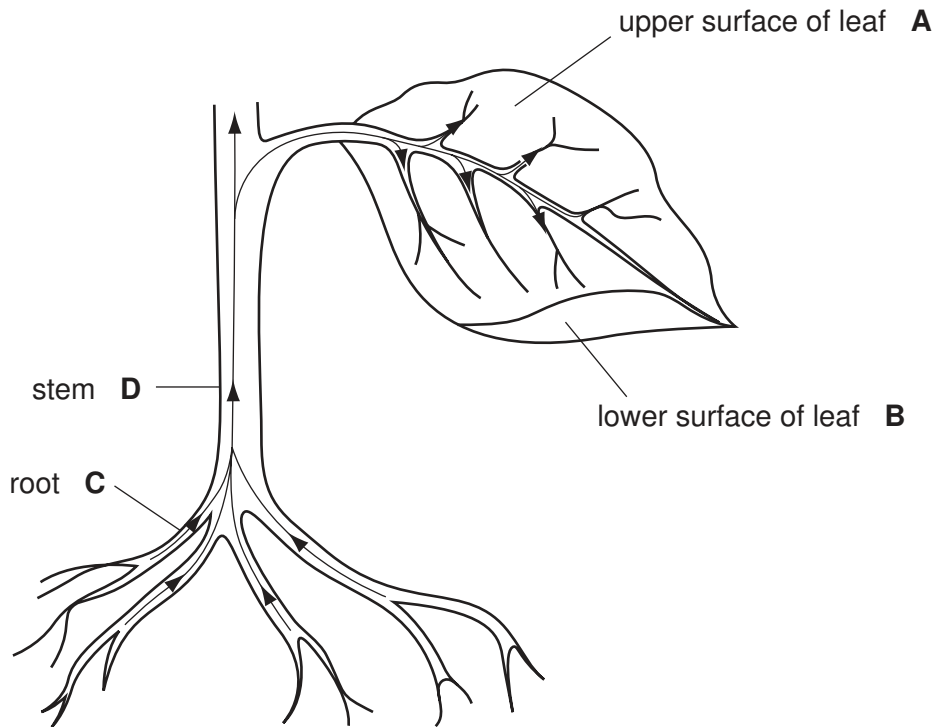


31 What is the function of the gall bladder?

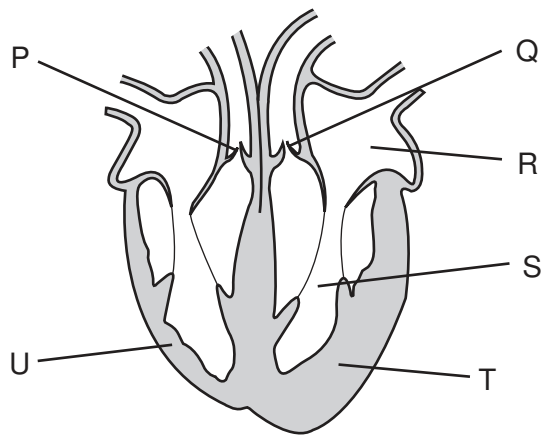
- A** absorption of fat
- B** digestion of fat
- C** production of bile
- D** storage of bile

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.



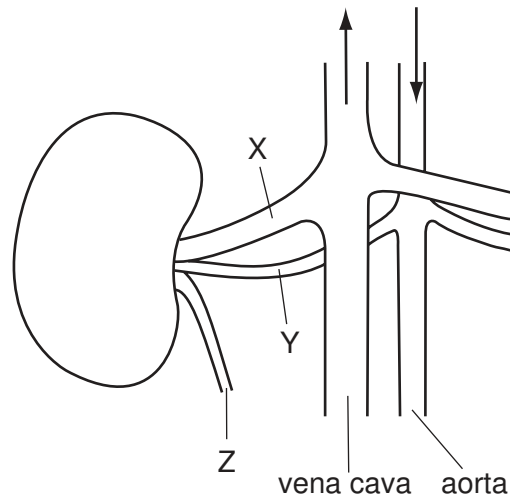
Which feature suggests that the blood leaves the heart at different pressures, going to the lungs and to the body?

- 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

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

- A carbon dioxide
- B ethanol
- C lactic acid
- D oxygen

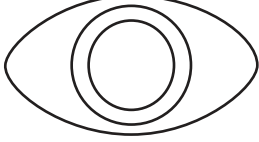
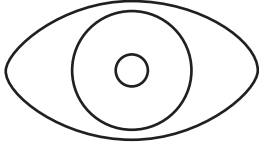
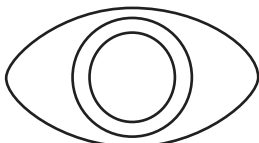
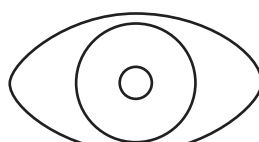
35 The diagram shows the structures associated with a human kidney.



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

- 36 What is the appearance of the eye, and the state of the circular muscles of the iris, when viewing an object in **bright** light?

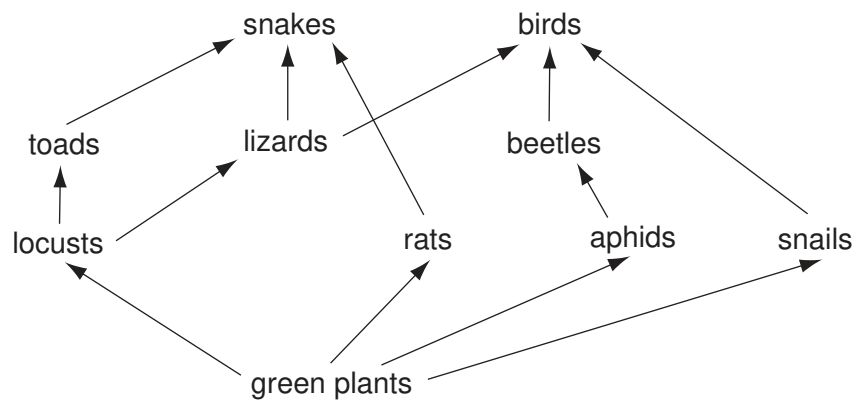
	front view of eye	state of circular muscles of iris
A		contracted
B		contracted
C		relaxed
D		relaxed

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

	alcohol	heroin
A	✓	✓
B	✓	x
C	x	✓
D	x	x

key
 ✓ = yes
 x = no

38 The diagram shows a food web in woodland.

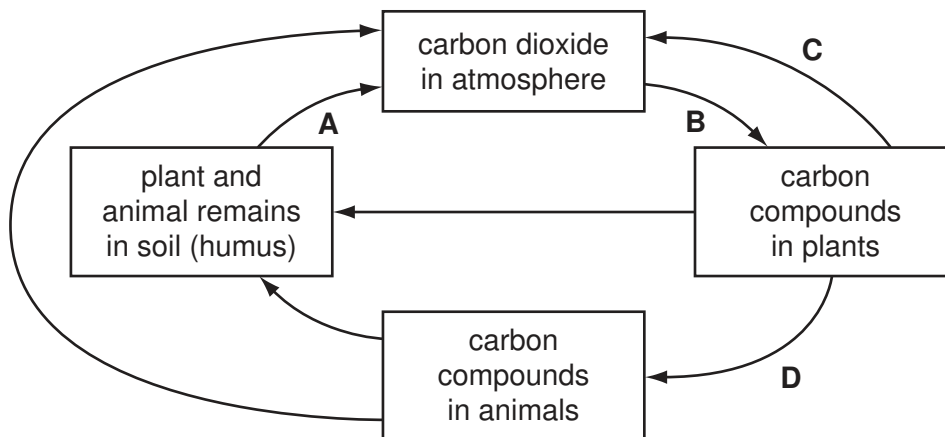


In this food web a beetle is a

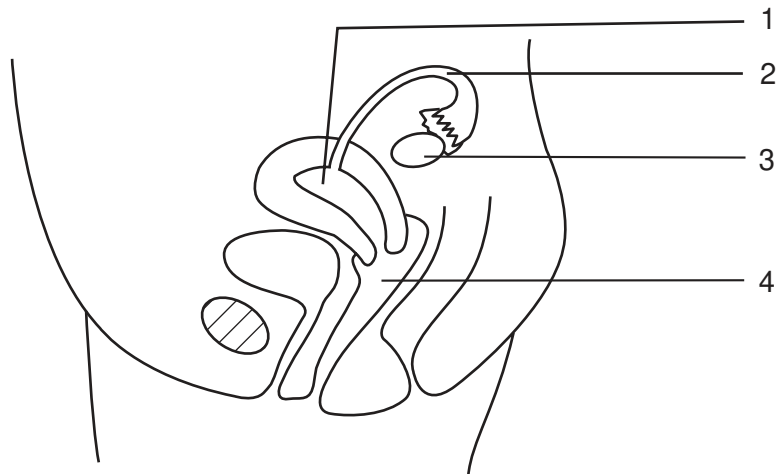
- A carnivore.
- B decomposer.
- C herbivore.
- D producer.

39 The diagram shows part of the carbon cycle.

Which arrow represents the process of photosynthesis?



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

DATA SHEET
The Periodic Table of the Elements

		Group																																																																																							
I	II	III	IV	V	VI	VII	0																																																																																		
7 Li Lithium 3	9 Be Beryllium 4	1 H Hydrogen 1	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	23 V Vanadium 23	24 Cr Chromium 24	25 Mn Manganese 25	26 Fe Iron 26	27 Co Cobalt 27	28 Ni Nickel 28	29 Cu Copper 29	30 Zn Zinc 30	31 B Boron 5	32 Ge Germanium 32	33 As Arsenic 33	34 Se Selenium 34	35 Br Bromine 35	36 Kr Krypton 36	37 Rb Rubidium 37	38 Sr Strontium 38	39 Y Yttrium 39	40 Ca Calcium 20	41 Nb Niobium 41	42 Mo Molybdenum 42	43 Tc Technetium 43	44 Ru Ruthenium 44	45 Rh Rhodium 45	46 Pd Palladium 46	47 Ag Silver 47	48 Cd Cadmium 48	49 In Indium 49	50 Tl Thallium 81	51 Sb Antimony 51	52 Te Tellurium 52	53 I Iodine 53	54 Xe Xenon 54	55 Cs Caesium 55	56 Ba Barium 56	57 La Lanthanum 57	72 Hf Hafnium 72	73 Ta Tantalum 73	74 W Tungsten 74	75 Re Rhenium 75	76 Os Osmium 76	77 Ir Iridium 77	78 Pt Platinum 78	79 Au Gold 79	80 Hg Mercury 80	81 Tl Thallium 81	82 Pb Lead 82	83 Bi Bismuth 83	84 Po Polonium 84	85 At Astatine 85	86 Rn Radon 86	87 Fr Francium 87	88 Ra Radium 88	89 Ac Actinium 89	90 Th Thorium 90	91 Pa Protactinium 91	92 U Uranium 92	93 Np Neptunium 93	94 Pu Plutonium 94	95 Am Americium 95	96 Cm Curium 96	97 Bk Berkelium 97	98 Cf Californium 98	99 Es Einsteinium 99	100 Fm Fermium 100	101 Md Mendelevium 101	102 No Nobelium 102	103 Lr Lawrencium 103	104 Rf Rutherfordium 104	105 Db Dubnium 105	106 Sg Seaborgium 106	107 Bh Bohrium 107	108 Hs Hassium 108	109 Mt Meitnerium 109	110 Ds Darmstadtium 110	111 Rg Roentgenium 111	112 Cn Copernicium 112	113 Nh Nihonium 113	114 Fl Flerovium 114	115 Mc Moscovium 115	116 Lv Livermorium 116	117 Ts Tennessine 117	118 Og Oganesson 118
												11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	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	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	109 Co Cobalt 27	110 Ni Nickel 28	115 Pd Palladium 46	116 Ag Silver 47	117 Cd Cadmium 48	120 Hg Mercury 80	137 Cs Caesium 55	138 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	182 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	210 Po Polonium 84	210 At Astatine 85	222 Rn Radon 86	226 Ra Radium 88	227 Ac Actinium 89	232 Th Thorium 90	232 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	244 Pu Plutonium 94	244 Am Americium 95	244 Cm Curium 96	244 Bk Berkelium 97	244 Cf Californium 98	244 Es Einsteinium 99	244 Fm Fermium 100	244 Md Mendelevium 101	244 No Nobelium 102	244 Lr Lawrencium 103	244 Rf Rutherfordium 104	244 Db Dubnium 105	244 Sg Seaborgium 106	244 Bh Bohrium 107	244 Hs Hassium 108	244 Mt Meitnerium 109	244 Ds Darmstadtium 110	244 Rg Roentgenium 111	244 Cn Copernicium 112	244 Nh Nihonium 113	244 Fl Flerovium 114	244 Mc Moscovium 115	244 Lv Livermorium 116	244 Ts Tennessine 117	244 Og Oganesson 118	

*58-71 Lanthanoid series
90-103 Actinoid series

Key

a	X	b
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a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).