

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.

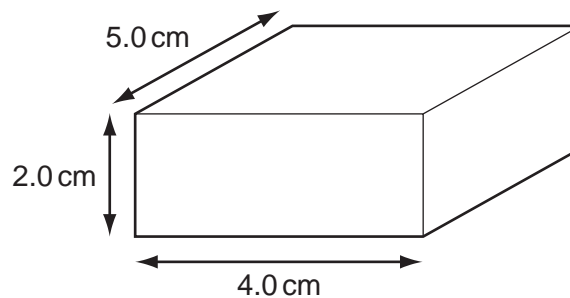
This document consists of **16** printed pages.



- 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.



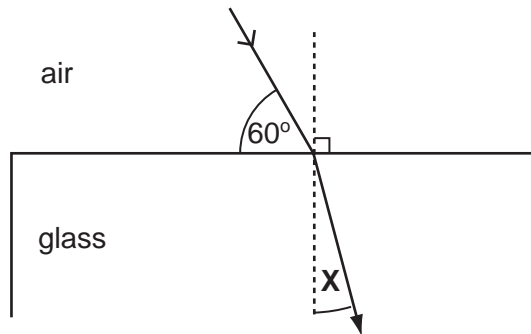
What is the density of the solid?

- A  $0.40 \text{ g/cm}^3$
  - B  $2.5 \text{ g/cm}^3$
  - C  $5.0 \text{ g/cm}^3$
  - D  $10 \text{ g/cm}^3$
- 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  $100^\circ\text{C}$  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.

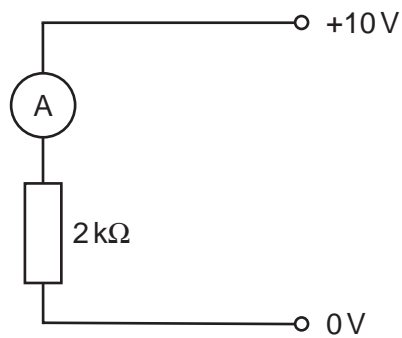
7 A ray of light passes into a parallel-sided glass block of refractive index 1.5 .



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

- A  $19.5^\circ$
- B  $25^\circ$
- C  $35^\circ$
- D  $48.5^\circ$

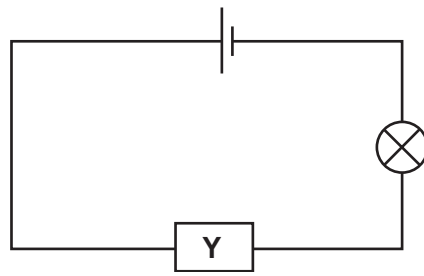
8 An ammeter is connected in the circuit as shown.



Which current flows through the ammeter?

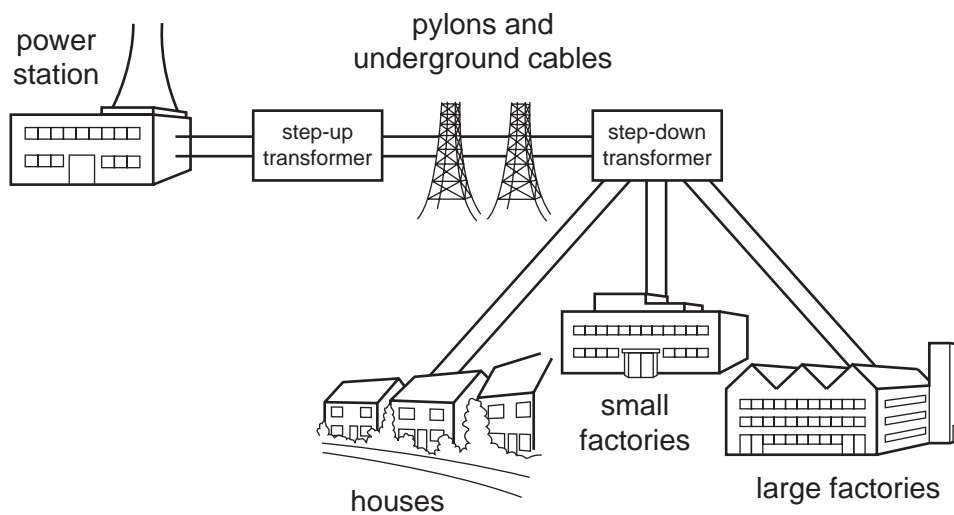
- A 5 mA
- B 20 mA
- C 0.2 A
- D 5 A

- 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
<b>A</b>	92	143	143
<b>B</b>	92	235	235
<b>C</b>	143	92	92
<b>D</b>	235	92	92

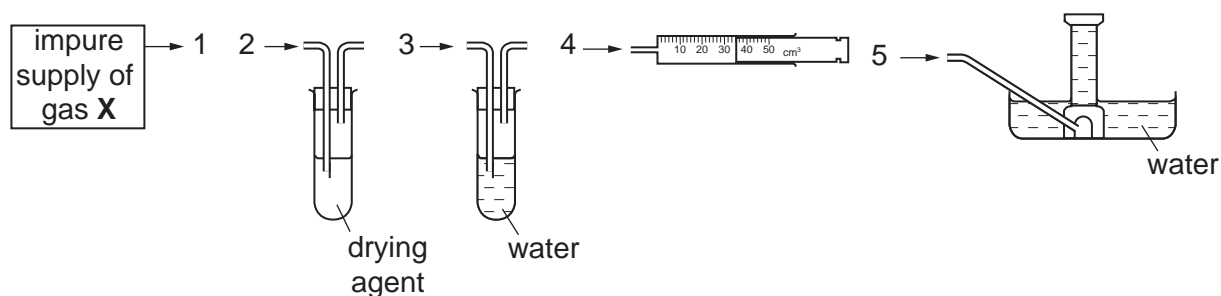
13 A radioactive material gives a count rate of 8000 counts per minute.

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?

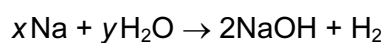
	arrangement of electrons
<b>A</b>	2.1
<b>B</b>	2.4
<b>C</b>	2.7
<b>D</b>	2.8

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
<b>A</b>	808	1465	✓	✓
<b>B</b>	-114	78	x	x
<b>C</b>	64	748	✓	✓
<b>D</b>	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  $y$ ?

	$x$	$y$
<b>A</b>	1	1
<b>B</b>	1	2
<b>C</b>	2	1
<b>D</b>	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.

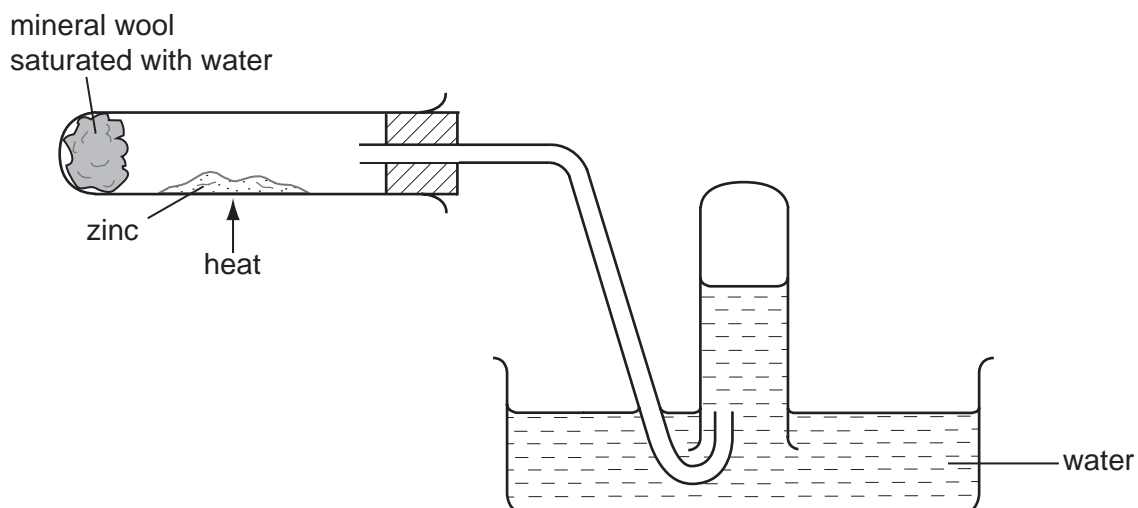
Which of the following is a property of astatine?

- 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
<b>A</b>	they are insoluble in water	they react with alkalis
<b>B</b>	they are soluble in water	they react with acids
<b>C</b>	they are soluble in water	their oxides react with alkalis
<b>D</b>	they can be drawn into wires	their oxides react with acids

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



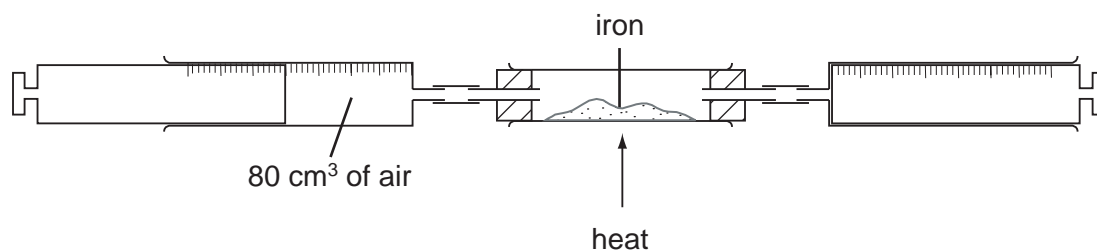
Which equation represents the reaction taking place?

- 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
<b>A</b>	high	below 1000 °C
<b>B</b>	high	above 1000 °C
<b>C</b>	low	below 1000 °C
<b>D</b>	low	above 1000 °C

24 An 80 cm<sup>3</sup> 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<sup>3</sup>      **B** 64 cm<sup>3</sup>      **C** 20 cm<sup>3</sup>      **D** 16 cm<sup>3</sup>



- 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

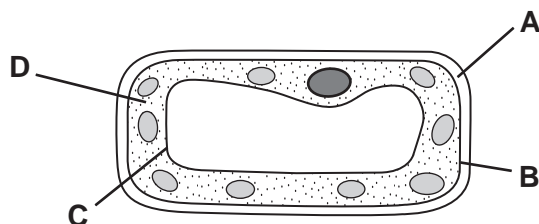
- 27 Vinegar is made by the reaction of ethanol with air.

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?



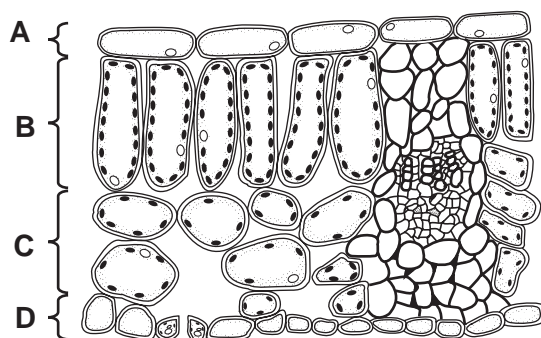
29 The table shows the results of an experiment to investigate the effect of temperature on amylase activity. The amount of sugar produced from four identical starch solutions is measured at four different temperatures.

At which temperature is amylase most active?

	temperature / °C	amount of sugar / units
<b>A</b>	15	19
<b>B</b>	25	38
<b>C</b>	35	42
<b>D</b>	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?

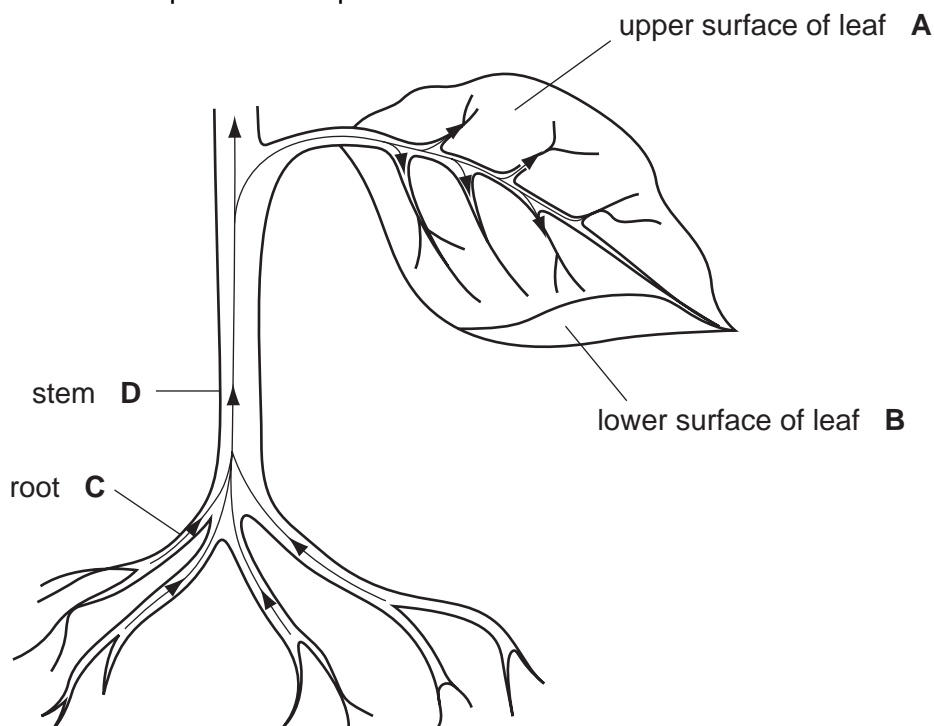


31 What is the function of the gall bladder?

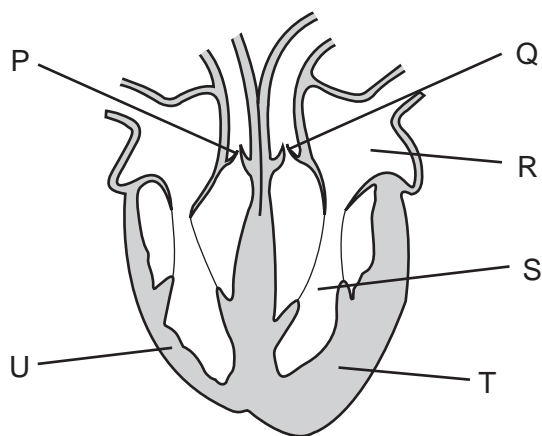
- A** absorption of fat
- B** digestion of fat
- C** production of bile
- D** storage of bile

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.



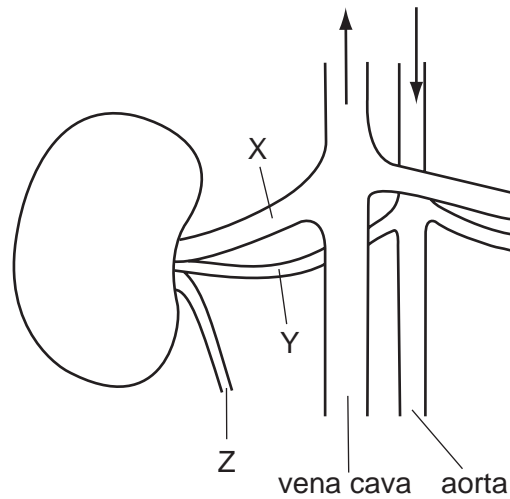
Which feature suggests that the blood leaves the heart at different pressures, going to the lungs and to the body?

- 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

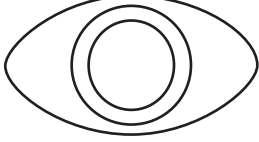
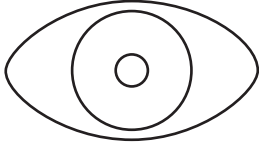
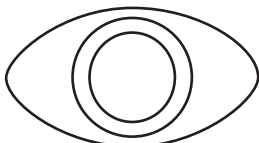
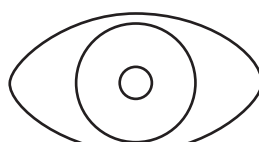
35 The diagram shows the structures associated with a human kidney.



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

	X	Y	Z
<b>A</b>	higher	lower	higher
<b>B</b>	higher	lower	lower
<b>C</b>	lower	higher	higher
<b>D</b>	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?

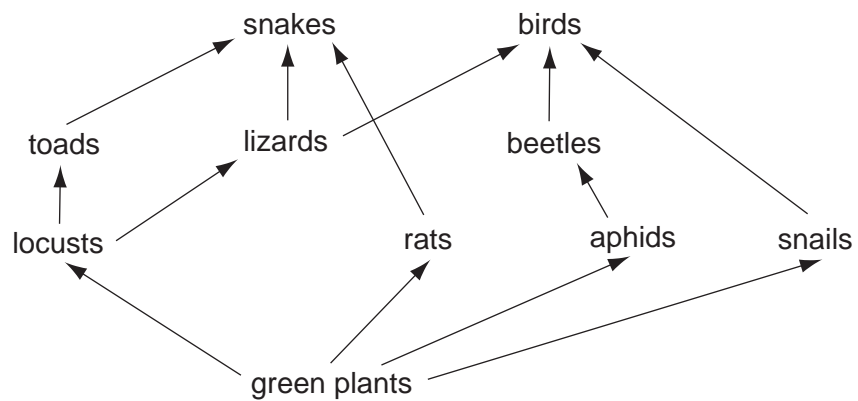
	front view of eye	state of circular muscles of iris
<b>A</b>		contracted
<b>B</b>		contracted
<b>C</b>		relaxed
<b>D</b>		relaxed

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

	alcohol	heroin
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

key  
 ✓ = yes  
 x = no

38 The diagram shows a food web in woodland.

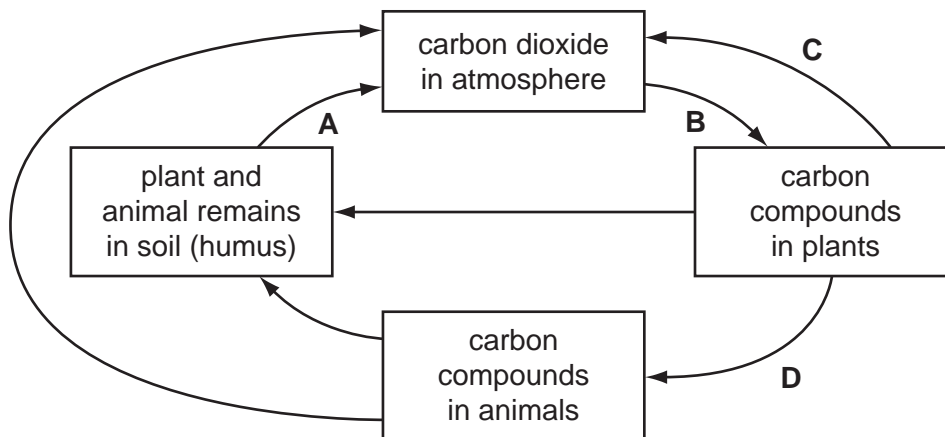


In this food web a beetle is a

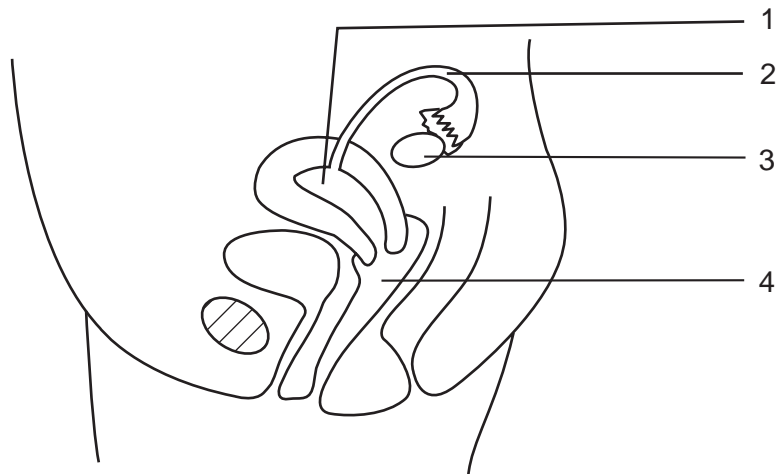
- A carnivore.
- B decomposer.
- C herbivore.
- D producer.

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
<b>A</b>	1	2
<b>B</b>	1	3
<b>C</b>	4	2
<b>D</b>	4	3

**DATA SHEET**  
**The Periodic Table of the Elements**

		Group																				
I	II	III	IV	V	VI	VII	0						0									
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4	1 <b>H</b> Hydrogen 1										4 <b>He</b> Helium 2										
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	14 <b>N</b> Nitrogen 7	16 <b>O</b> Oxygen 8	19 <b>F</b> Fluorine 9	20 <b>Ne</b> Neon 10	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulphur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18									
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	65 <b>Zn</b> Zinc 30	64 <b>Cu</b> Copper 29	59 <b>Ni</b> Nickel 28	59 <b>Co</b> Cobalt 27	56 <b>Fe</b> Iron 26	55 <b>Mn</b> Manganese 25	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36									
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	112 <b>Cd</b> Cadmium 48	108 <b>Ag</b> Silver 47	106 <b>Pd</b> Palladium 46	103 <b>Rh</b> Rhodium 45	101 <b>Ru</b> Ruthenium 44	101 <b>Tc</b> Technetium 43	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54									
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	201 <b>Hg</b> Mercury 80	197 <b>Au</b> Gold 79	195 <b>Pt</b> Platinum 78	192 <b>Ir</b> Iridium 77	190 <b>Os</b> Osmium 76	186 <b>Re</b> Rhenium 75	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86									
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	226 <b>Ac</b> Actinium											89									
*58-71 Lanthanoid series																						
90-103 Actinoid series																						
<table style="width: 100%; border: none;"> <tr> <td style="border: 1px solid black; padding: 2px;">a</td> <td style="border: 1px solid black; padding: 2px;"><b>X</b></td> <td style="border: 1px solid black; padding: 2px;">b</td> </tr> </table>														a	<b>X</b>	b						
a	<b>X</b>	b																				
<table style="width: 100%; border: none;"> <tr> <td style="border: none;">a</td> <td style="border: none;">=</td> <td style="border: none;">relative atomic mass</td> </tr> <tr> <td style="border: none;">X</td> <td style="border: none;">=</td> <td style="border: none;">atomic symbol</td> </tr> <tr> <td style="border: none;">b</td> <td style="border: none;">=</td> <td style="border: none;">proton (atomic) number</td> </tr> </table>														a	=	relative atomic mass	X	=	atomic symbol	b	=	proton (atomic) number
a	=	relative atomic mass																				
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140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71	232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92									
232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103	238 <b>U</b> Uranium 92									

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).