

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

COMBINED SCIENCE

5129/01

Paper 1 Multiple Choice

October/November 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.

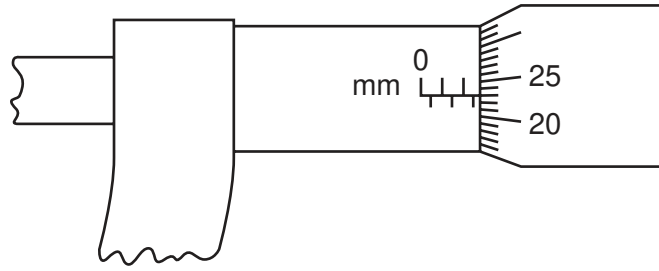
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

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

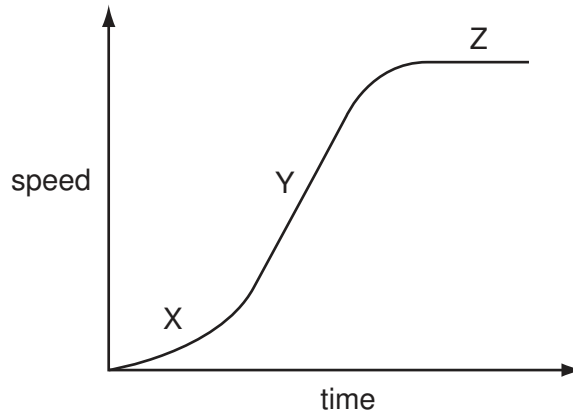


- 1 The diagram shows a micrometer.



Which reading is shown?

- A** 2.23 mm **B** 2.73 mm **C** 3.23 mm **D** 5.23 mm
- 2 The graph shows how the speed of a car changes with time.

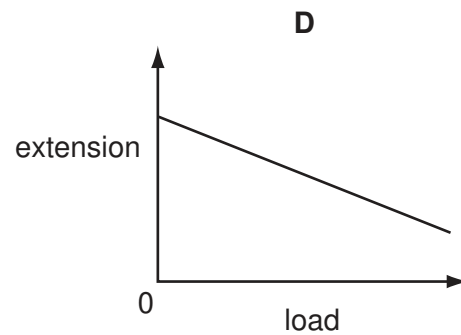
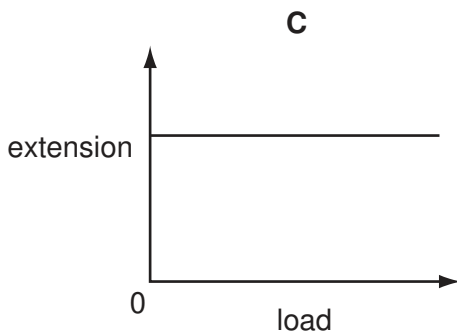
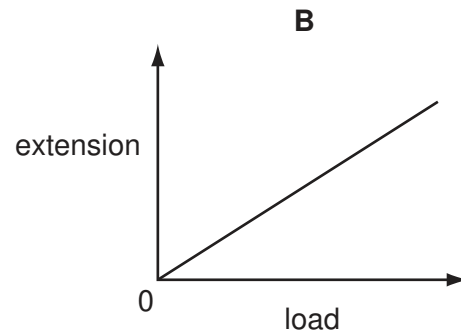
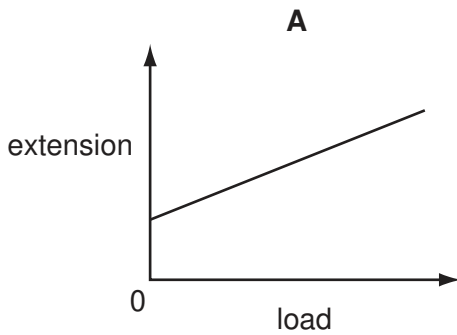


Which statement is correct?

- A** at X the car has constant acceleration
B at Y the car has acceleration which is not constant
C at Z the car has constant speed
D at Z the car is at rest

- 3 A student adds different loads to the end of a spring. She finds the extension in each case and plots a graph of extension against load.

What is the correct graph?

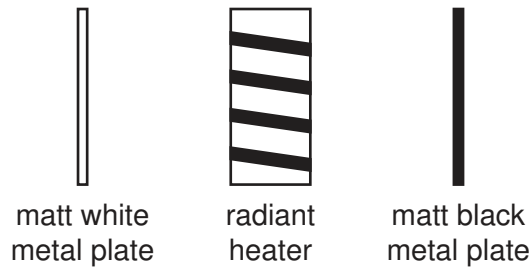


- 4 A man weighs 600 N. He runs up stairs of total height 4 metres in 3 seconds.

How much power is exerted by the man?

- A** 450 W **B** 800 W **C** 2400 W **D** 7200 W

- 5 Two identical metal plates are painted, one matt white and the other matt black. These are placed at equal distances from a radiant heater as shown. The heater is turned on for five minutes.



Which metal plate absorbs more energy and which plate emits more energy in this time?

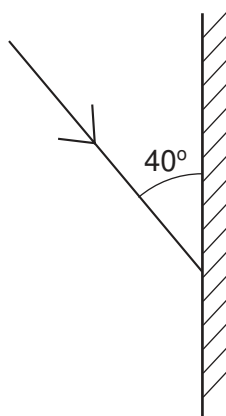
	absorbs more	emits more
A	black	black
B	black	white
C	white	black
D	white	white

- 6 A surf-board moves at a speed of 5 m / s on the crest of a wave. The distance between successive wave crests is 10 m.

What is the frequency of the wave motion?

- A** 0.5 Hz **B** 2 Hz **C** 5 Hz **D** 10 Hz

- 7 The diagram shows a single ray of light being directed at a plane mirror.



What are the angles of incidence and reflection?

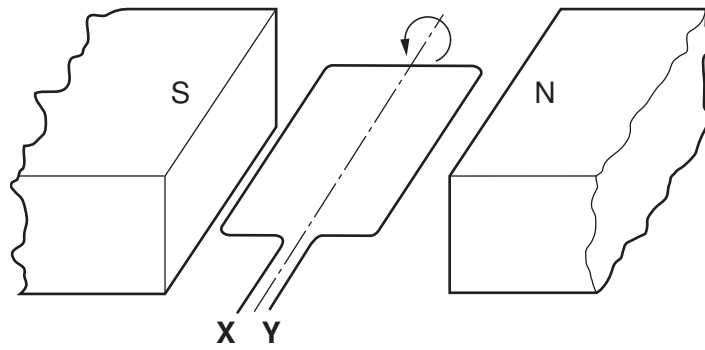
	angle of incidence	angle of reflection
A	40°	40°
B	40°	50°
C	50°	40°
D	50°	50°

- 8 A battery moves a charge of 60 C around a circuit in a time of 20 s.

What is the average current in the circuit?

- A** 0.3 A **B** 3.0 A **C** 40 A **D** 1200 A
- 9 Which is the **highest** rated appliance that can be connected to the 240 V mains supply using a plug with a 3 A fuse?
- A** a 60W light bulb
B a 100W light bulb
C a 200W television
D a 500W heater
- 10 Which of the following would be repelled by the S pole of a bar magnet?
- A** a copper bar
B a soft iron bar
C the N pole of a second bar magnet
D the S pole of a second bar magnet

11 The diagram shows a coil in a magnetic field.



When the coil is part of an a.c. generator, what must be connected directly to **X** and **Y**?

- A a.c. supply
- B carbon brushes
- C slip rings
- D soft-iron core

12 Which table correctly identifies the locations of protons, neutrons and electrons in an atom?

A

	nucleus	
	inside	outside
electrons	✓	
neutrons	✓	
protons		✓

B

	nucleus	
	inside	outside
electrons		✓
neutrons	✓	
protons	✓	

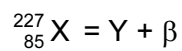
C

	nucleus	
	inside	outside
electrons	✓	
neutrons		✓
protons		✓

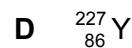
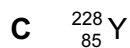
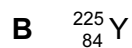
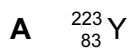
D

	nucleus	
	inside	outside
electrons		✓
neutrons		✓
protons	✓	

13 A radioactive nucleus X, decays by emitting a beta-particle to form a nucleus, Y.

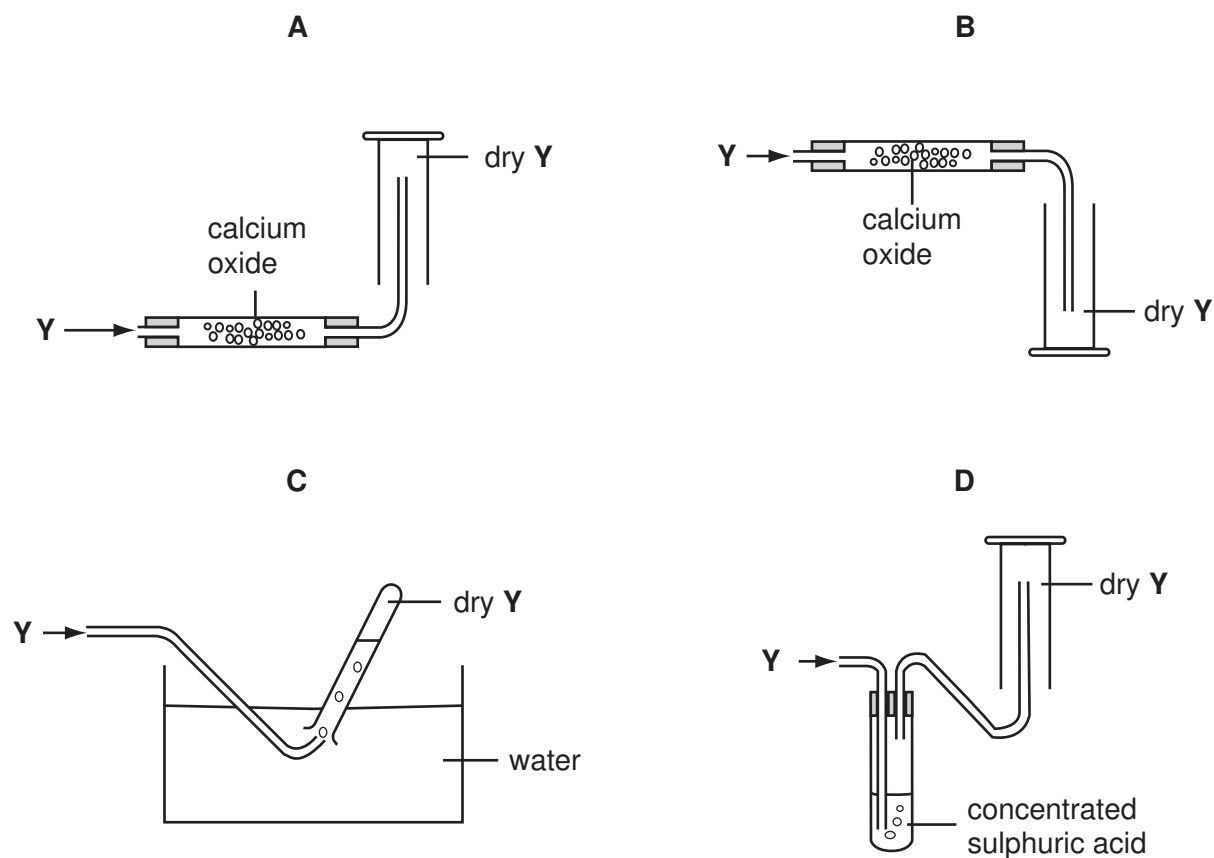


What represents nucleus Y?



14 A gas Y, is less dense than air, very soluble in water and is an alkali.

Which method is used to collect a dry sample of the gas?



15 Which changes occur when a liquid at 50°C becomes a gas at 120°C?

	separation of particles	energy of particles	attractive force between particles
A	decreases	increases	decreases
B	decreases	decreases	increases
C	increases	increases	decreases
D	increases	decreases	increases

16 A nucleus is represented by the symbol ${}_{37}^{81}\text{X}$.

What does this nucleus contain?

- A** 37 electrons and 44 neutrons
- B** 37 neutrons and 81 protons
- C** 37 protons and 44 neutrons
- D** 37 protons and 81 neutrons

17 Element X has an electronic structure 2.8.8.1.

Element Y has an electronic structure 2.8.6.

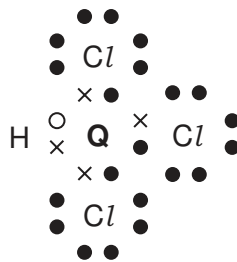
What is made when X and Y react?

	type of compound	formula
A	covalent compound	X_2Y
B	covalent compound	XY_2
C	ionic compound	X_2Y
D	ionic compound	XY_2

18 Element Q has four electrons in its outermost shell.

Element Q can combine with hydrogen and chlorine to form a compound $QHCl_3$.

The diagram shows the electronic structure of $QHCl_3$ (outer shell electrons only).



Which of these properties will this compound have?

- A** It will be a solid at room temperature.
- B** It will be readily soluble in water.
- C** It will be a good conductor of electricity.
- D** It will have a low boiling point.

19 Aqueous potassium sulphate can be prepared by titrating dilute sulphuric acid against aqueous potassium carbonate.

Which conclusion can be drawn from this information?

- A** Potassium carbonate is insoluble in water.
- B** Potassium carbonate neutralises sulphuric acid.
- C** Potassium sulphate is a base.
- D** Potassium sulphate is insoluble in water.

20 The table shows the results of halogen displacement experiments.

halogen added	halide solution		
	X ⁻	Y ⁻	Z ⁻
X ₂	–	Y ₂ displaced	Z ₂ displaced
Y ₂	no reaction	–	no reaction
Z ₂	no reaction	Y ₂ displaced	–

What are halogens X, Y and Z?

	X	Y	Z
A	Br	Cl	I
B	Br	I	Cl
C	Cl	Br	I
D	Cl	I	Br

21 The results of adding some metals to salt solutions are shown below.

copper + zinc sulphate → no reaction

magnesium + zinc sulphate → magnesium sulphate + zinc

copper + silver sulphate → copper(II) sulphate + silver

What is the order of reactivity of the metals?

	most reactive \longrightarrow least reactive			
A	magnesium	copper	zinc	silver
B	magnesium	zinc	copper	silver
C	silver	copper	zinc	magnesium
D	zinc	magnesium	silver	copper

22 Which statement about the production of iron from haematite is correct?

- A** Coke is used to oxidise the slag.
- B** Limestone is used to produce oxygen for the coke to burn.
- C** Molten iron floats on slag at the furnace base.
- D** The haematite is reduced by carbon monoxide.

23 Why is aluminium used to make food containers that are resistant to corrosion?

- A It does not react with acids.
- B It forms a covalent oxide.
- C It forms an alloy with zinc.
- D It has a protective oxide layer on its surface.

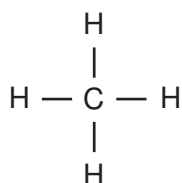
24 All the members of a homologous series have the same

- A empirical formula.
- B general formula.
- C molecular formula.
- D physical properties.

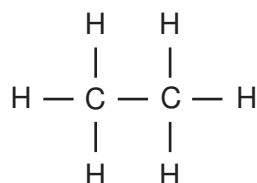
25 What does **not** happen in the complete combustion of propane, C_3H_8 ?

- A a deposit of soot is formed
- B carbon-carbon bonds break
- C carbon-oxygen bonds form
- D energy is released

26 The names and molecular structure of two alkanes are shown.



methane



ethane

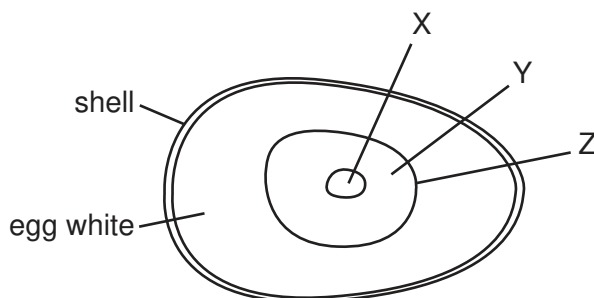
What is the next alkane in the homologous series?

	name	formula
A	butane	C_3H_6
B	butane	C_3H_8
C	propane	C_3H_6
D	propane	C_3H_8

27 Which compound will decolourise aqueous bromine?

- A ethane
- B ethanoic acid
- C ethene
- D poly(ethene)

28 The yellow part of a hen's egg is a large cell containing a lot of yolk. The diagram shows an unfertilised hen's egg.



What do the labels represent?

	cell membrane	cytoplasm	nucleus
A	X	Y	Z
B	X	Z	Y
C	Z	X	Y
D	Z	Y	X

29 A piece of plant tissue is transferred from a beaker of water into a 10% sucrose solution.

What happens?

	movement of water	volume of tissue cells
A	enters the cells	decreases
B	enters the cells	increases
C	leaves the cells	decreases
D	leaves the cells	increases

30 Under which conditions does amylase act on starch most quickly?

	pH	temperature
A	acidic	30 °C
B	acidic	60 °C
C	neutral	30 °C
D	neutral	60 °C

31 What is the function of chlorophyll in plants?

- A** to absorb carbon dioxide
- B** to absorb light
- C** to absorb oxygen
- D** to absorb water

32 Where in the alimentary canal is most water absorbed?

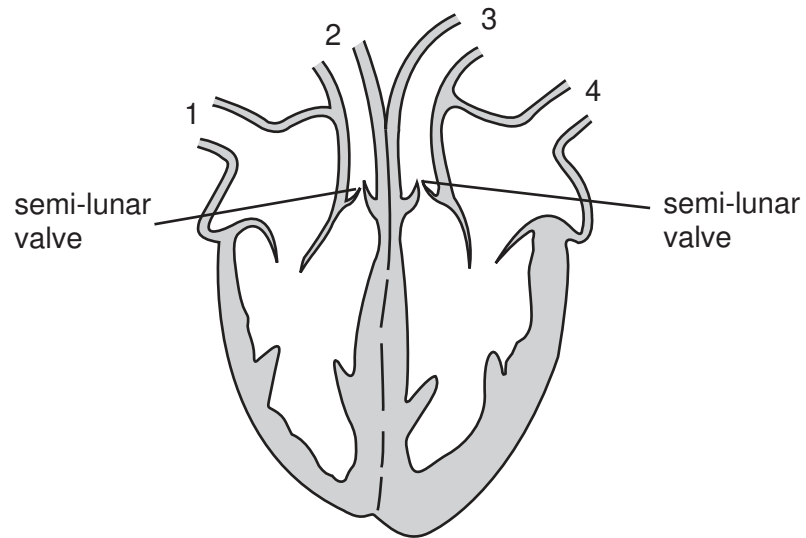
- A** colon
- B** ileum
- C** oesophagus
- D** stomach

33 A green plant starts to wilt. It is then given water, and after a short time it recovers.

Which process causes this recovery?

- A** assimilation
- B** osmosis
- C** respiration
- D** transpiration

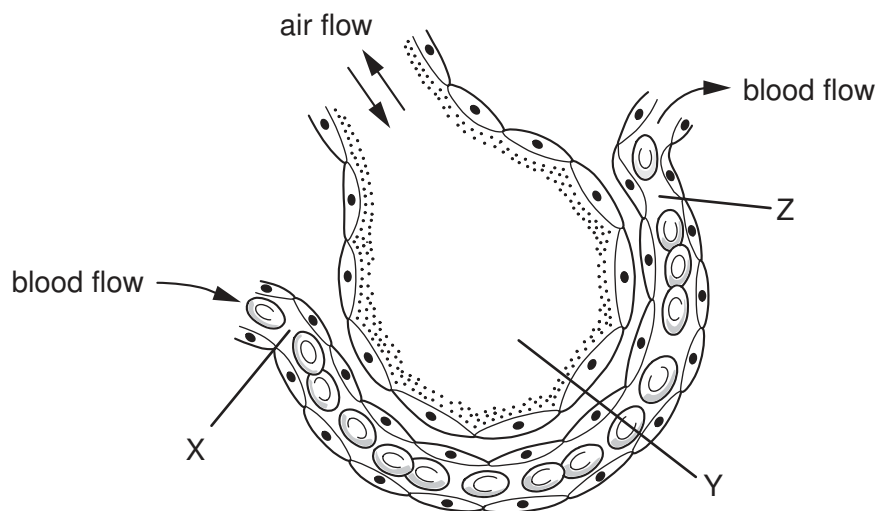
34 The diagram shows a section through the human heart.



What happens as blood is being pumped to the lungs?

	semi-lunar valves	vessel through which blood passes to the lungs
A	closed	4
B	closed	3
C	open	2
D	open	1

35 The diagram shows a section of an alveolus and a capillary in a lung.



What are the relative concentrations of **carbon dioxide** at X, Y and Z?

	X	Y	Z
A	high	high	high
B	high	low	low
C	low	high	high
D	low	high	low

36 A person is sitting in a dark room.

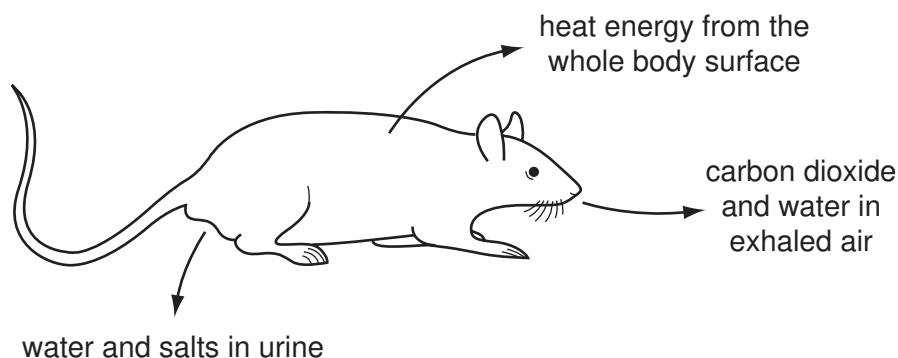
What happens in the eye when a light is switched on?

	circular muscle of iris	size of pupil
A	contracts	decreases
B	contracts	increases
C	relaxes	decreases
D	relaxes	increases

37 Which statement is true of heroin and also true of excessive use of alcohol?

- A** Their use can lead to habitual criminal behaviour.
- B** They are stimulants.
- C** They are usually taken by injection.
- D** They produce only mild withdrawal symptoms.

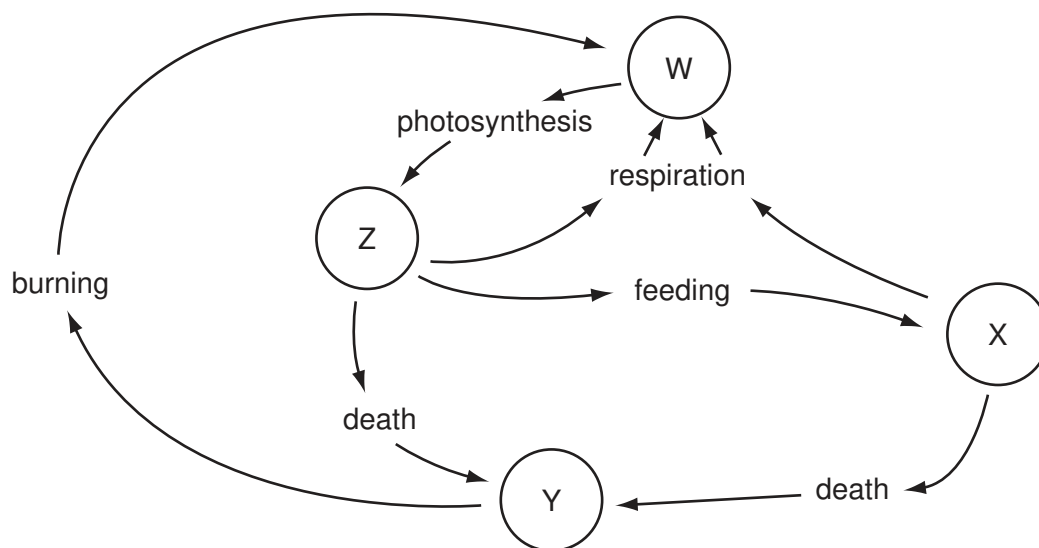
38 The diagram shows losses from a rat to the environment.



What will **not** be returned to the ecosystem and recycled?

- A carbon dioxide
- B heat energy
- C salts
- D water

39 The diagram shows some stages in the carbon cycle. W, X, Y and Z are carbon compounds.



What is W?

- A carbon compounds in animals
- B carbon compounds in plants
- C carbon dioxide
- D coal and oil

40 Which line indicates hormonal and mechanical birth control methods?

	hormonal	mechanical
A	pill	spermicide
B	pill	intra-uterine device (IUD)
C	condom	spermicide
D	condom	intra-uterine device (IUD)

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DATA SHEET
The Periodic Table of the Elements

Group		Group															
		I	II	III	IV	V	VI	VII	0								
		1 H Hydrogen 1															
7 Li Lithium 3	9 Be Beryllium 4																
23 Na Sodium 11	24 Mg Magnesium 12																
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	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	127 I Iodine 53	128 Te Tellurium 52	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	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	210 Rn Radon 86	
87 Fr Francium	88 Ra Radium	226 Ac Actinium 89															
		*58-71 Lanthanoid series															
		90-103 Actinoid series															
		<div style="display: flex; align-items: center; gap: 10px;"> <div style="border: 1px solid black; padding: 2px;">a</div> <div style="font-size: 2em; font-weight: bold;">X</div> <div style="border: 1px solid black; padding: 2px;">b</div> </div> <p>Key a = relative atomic mass X = atomic symbol b = proton (atomic) number</p>															
		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	175 Lr Lawrencium 103		
		232 Th Thorium 90	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103			

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