



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**COMBINED SCIENCE**

**5129/12**

Paper 1 Multiple Choice

**October/November 2012**

**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.

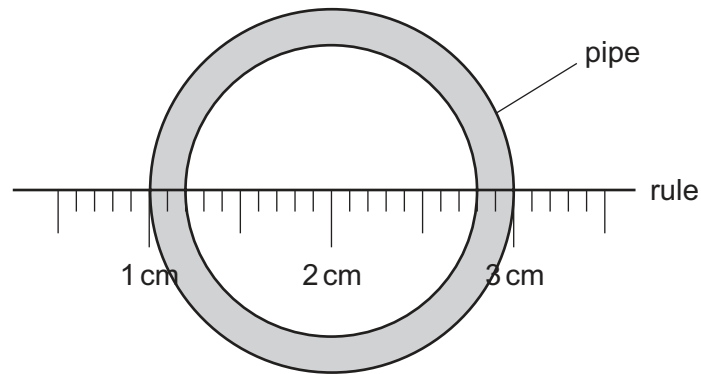
Any rough working should be done in this booklet.

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

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



- 1 A rule is used to measure the internal diameter of a pipe.



What is the internal diameter of the pipe?

- A** 1.6 cm      **B** 1.8 cm      **C** 2.0 cm      **D** 2.6 cm
- 2 A car of mass 1800 kg is brought to a halt. The deceleration is  $2 \text{ m/s}^2$ .
- What is the size of the force bringing the car to a halt?
- A** 900 N      **B** 3600 N      **C** 18 000 N      **D** 36 000 N
- 3 What describes the density of a material?
- A** the amount of matter in the material  
**B** the mass per unit volume of the material  
**C** the pull of gravity on the material  
**D** the volume per unit mass of the material
- 4 A cell will deliver 3000 J of energy to a 2 W electric motor before the cell is exhausted.
- How long will the motor run?
- A** 25 minutes  
**B** 100 minutes  
**C** 1500 minutes  
**D** 6000 minutes

- 5 A liquid-in-glass laboratory thermometer and a liquid-in-glass clinical thermometer have several properties in common.

Which statement is **not** correct?

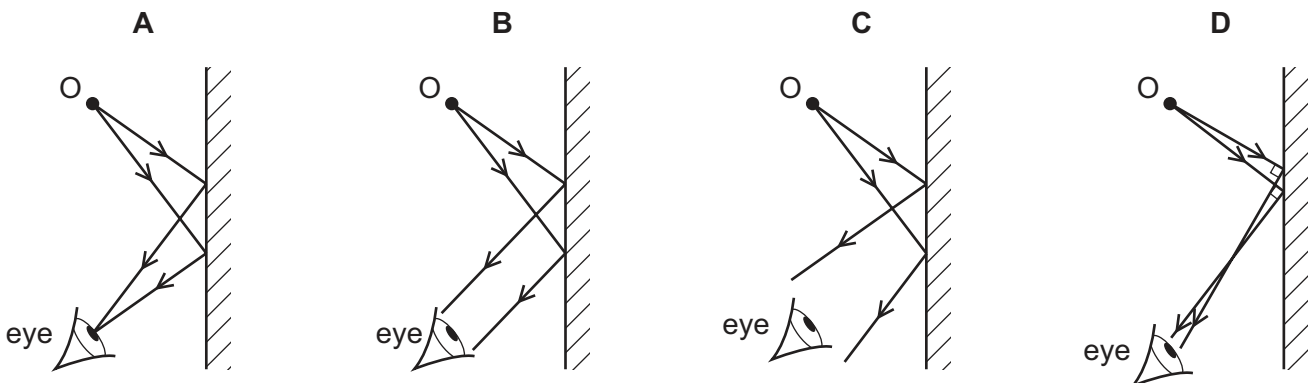
- A** Both thermometers have a graduated scale.
- B** Both thermometers have thin glass around the bulb.
- C** Both thermometers have a constriction in the tube.
- D** Both thermometers have a large bulb and a narrow bore.
- 6 What happens when a metal bar is heated?
- A** The distance between the molecules increases, making the bar longer.
- B** The molecules get larger, making the bar longer.
- C** The molecules vibrate more quickly, making the bar denser.
- D** The speed of the molecules increases, making the bar thinner.
- 7 Radio waves, visible light and X-rays are all part of the electromagnetic spectrum.

Which is the correct order of increasing wavelength?

	shortest wavelength	—————>	longest wavelength
<b>A</b>	visible light	radio waves	X-rays
<b>B</b>	visible light	X-rays	radio waves
<b>C</b>	X-rays	radio waves	visible light
<b>D</b>	X-rays	visible light	radio waves

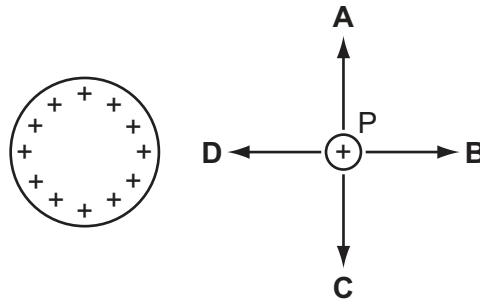
- 8 An eye views an object O by reflection in a plane mirror.

Which is the correct ray diagram?



- 9 A small positive charge, P, is positioned close to a positively charged sphere.

What is the direction of the electrostatic force on P?



- 10 Diagram 1 shows two cells in series with two lamps X and Y. Both lamps light with normal brightness.

Diagram 2 shows a resistor in series with the same cells and lamps.

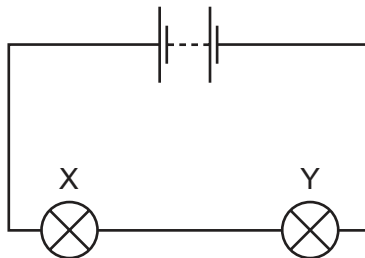


diagram 1

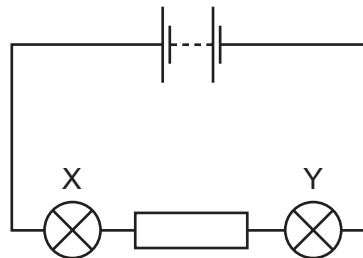


diagram 2

What is the brightness of lamp X and lamp Y in diagram 2?

	lamp X	lamp Y
<b>A</b>	brighter than normal	dimmer than normal
<b>B</b>	brighter than normal	normal
<b>C</b>	dimmer than normal	dimmer than normal
<b>D</b>	normal	dimmer than normal

- 11 To determine whether a material is magnetic, a student should

- A** find out if it is a metal or a non-metal.
- B** find out if it is a conductor or an insulator.
- C** find out if it can be given an electric charge.
- D** find out if it affects the direction in which a compass needle points.

- 12 The primary coil of a simple iron-cored transformer is connected to an a.c. source and then to a d.c. source. The secondary coil is connected to an oscilloscope and the output of the transformer is observed for each source.

Which row correctly describes the output for a given source?

	source	output
<b>A</b>	a.c.	a.c.
<b>B</b>	a.c.	d.c.
<b>C</b>	d.c.	a.c.
<b>D</b>	d.c.	d.c.

- 13 An atom has a nucleus surrounded by electrons.

What are the charges on the nucleus and on the whole atom?

	charge on nucleus	charge on whole atom
<b>A</b>	neutral	neutral
<b>B</b>	neutral	positive
<b>C</b>	positive	neutral
<b>D</b>	positive	positive

- 14 Which statement about the particles in a liquid is **not** correct?

- A** They are arranged in regular patterns.
- B** They can escape from the liquid.
- C** They form a definite surface.
- D** Their speed increases as temperature increases.

- 15 What can be deduced from the symbol  ${}^4_2\text{He}$  ?

- A** An atom of helium has two electrons.
- B** An atom of helium has two protons and four neutrons.
- C** Helium has a proton number of 4.
- D** Helium occurs as a diatomic molecule.

16 What is the best way of slowing down the reaction between magnesium and sulfuric acid?

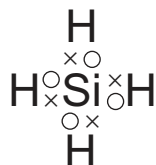
- A adding a catalyst to the reactants
- B diluting the acid used in the reaction
- C stirring the reagents
- D using magnesium powder instead of ribbon

17 The table gives some properties of four substances.

Which substance is covalently bonded?

	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 diagram shows the electronic structure of silane, SiH<sub>4</sub>.



Which row shows the properties of silane?

	conduction of electricity in the liquid state	melting point
<b>A</b>	good	high
<b>B</b>	good	low
<b>C</b>	non-conductor	high
<b>D</b>	non-conductor	low

19 Which mass of oxygen combines with 16 g of sulfur to form sulfur dioxide, SO<sub>2</sub>?

- A** 4g
- B** 8g
- C** 16g
- D** 32g

20 Different solids were added to separate test-tubes of warm dilute sulfuric acid.

For which solid is the observation correct?

	solid	observation
<b>A</b>	ammonium sulfate	alkaline gas produced
<b>B</b>	copper	gas evolved ignited with a pop
<b>C</b>	magnesium oxide	solid dissolved with no effervescence
<b>D</b>	zinc carbonate	gas evolved relights glowing splint

21 What is the order of reactivity of the halogens?

	most reactive	→	least reactive
<b>A</b>	bromine	chlorine	iodine
<b>B</b>	chlorine	bromine	iodine
<b>C</b>	iodine	bromine	chlorine
<b>D</b>	iodine	chlorine	bromine

22 Which metal does **not** react with dilute hydrochloric acid to give hydrogen?

- A** copper
- B** iron
- C** magnesium
- D** zinc

23 The boiling points of some elements are given in the table.

element	boiling point/°C
nitrogen	-196
xenon	-108
oxygen	-183

A mixture of nitrogen, xenon and oxygen at  $-200^{\circ}\text{C}$  is allowed to warm up to  $-150^{\circ}\text{C}$ .

Which elements are still in the liquid state at  $-150^{\circ}\text{C}$ ?

- A** a mixture of nitrogen and oxygen
- B** a mixture of nitrogen and xenon
- C** nitrogen only
- D** xenon only

24 Which reaction takes place in the blast furnace?

- A  $\text{FeCr}_2\text{O}_4 + 4\text{C} \rightarrow \text{Fe} + 2\text{Cr} + 4\text{CO}$
- B  $3\text{Fe} + 4\text{H}_2\text{O} \rightarrow \text{Fe}_3\text{O}_4 + 4\text{H}_2$
- C  $\text{SiO}_2 + \text{CaO} \rightarrow \text{CaSiO}_3$
- D  $\text{SiO}_2 + 2\text{NaOH} \rightarrow \text{Na}_2\text{SiO}_3 + \text{H}_2\text{O}$

25 Ammonium sulfate,  $(\text{NH}_4)_2\text{SO}_4$ , is added to soil to provide an element that is important for plant growth.

What is this element?

- A hydrogen
- B nitrogen
- C oxygen
- D sulfur

26 X reacts with steam to form Y.

Y can be oxidised to Z.

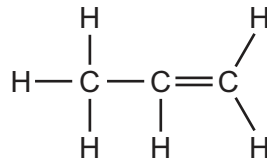


If Z is propanoic acid, what would be the formula of X?

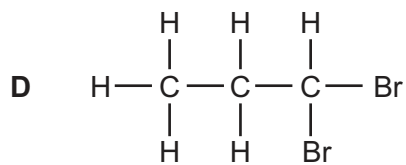
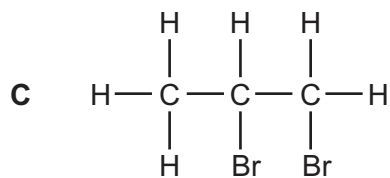
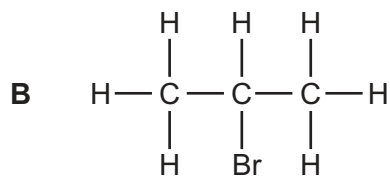
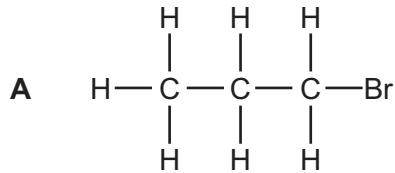
- A  $\text{C}_2\text{H}_4$
- B  $\text{C}_2\text{H}_6$
- C  $\text{C}_3\text{H}_6$
- D  $\text{C}_3\text{H}_8$



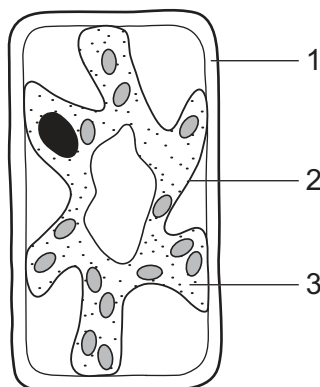
27 Propene is an unsaturated hydrocarbon. Its structure is shown.



What is produced when propene reacts with bromine?



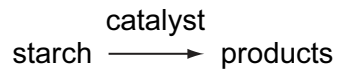
28 The diagram shows a typical plant cell after being placed into a concentrated salt solution for ten minutes.



Which numbered structures are partially permeable?

- A** 1 and 2 only    **B** 1 and 3 only    **C** 1 only    **D** 2 only

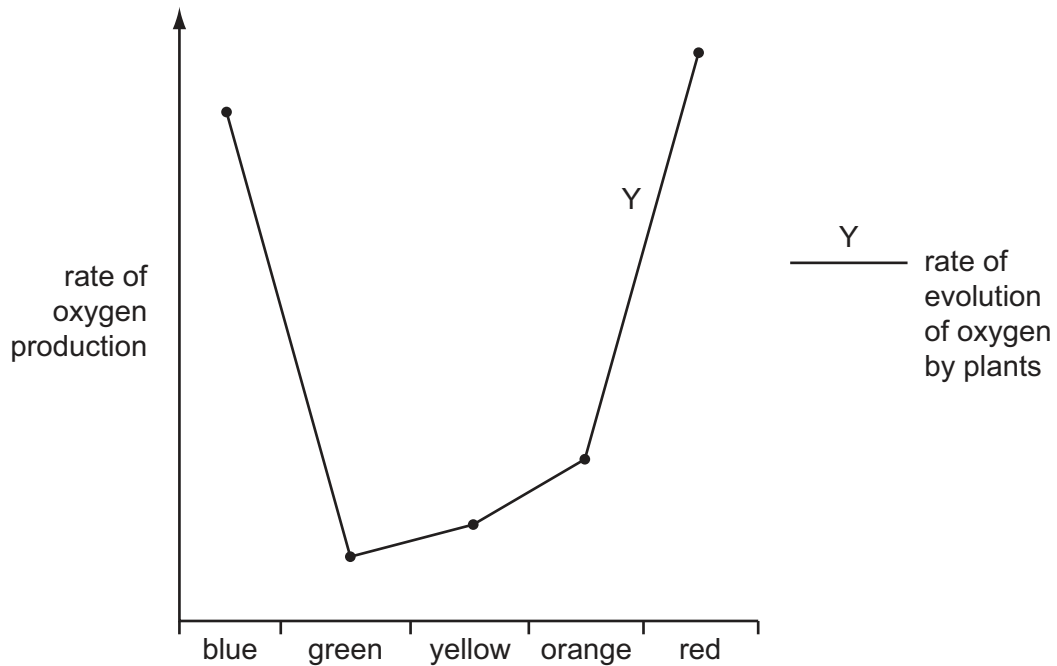
29 The following reaction occurs in the human alimentary canal.



What are the catalyst and the product?

	catalyst	product
<b>A</b>	acid	glucose
<b>B</b>	alkali	energy
<b>C</b>	amylase	maltose
<b>D</b>	bile	amino acid

30 The graph shows the effect of different colours of light on the rate of oxygen production by green plants.

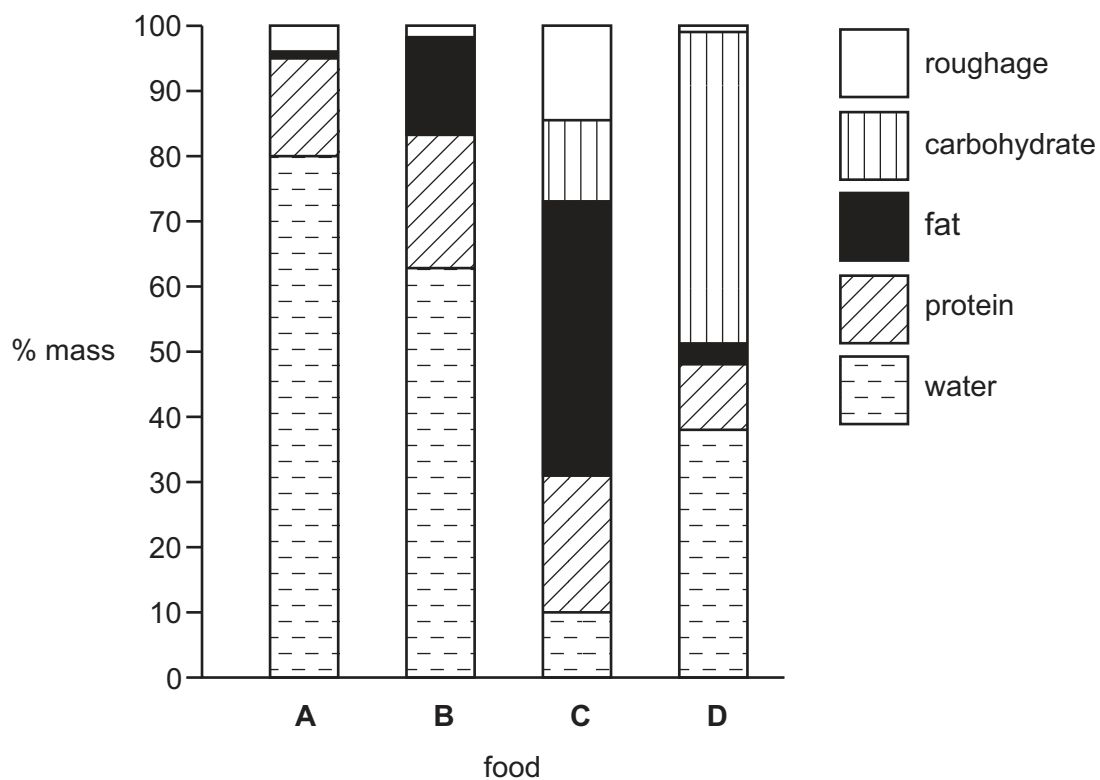


What can be deduced from the graph?

- A** Photosynthesis is least active in green light.
- B** Photosynthesis is most active in green light.
- C** Respiration is least active in green light.
- D** Respiration is most active in green light.

31 The diagram shows the composition of four foods.

Which food will provide the most energy per gram?



32 How do these substances enter a plant's root hairs?

	nitrate	oxygen	water
A	active transport	diffusion	osmosis
B	diffusion	osmosis	active transport
C	osmosis	active transport	diffusion
D	osmosis	diffusion	active transport

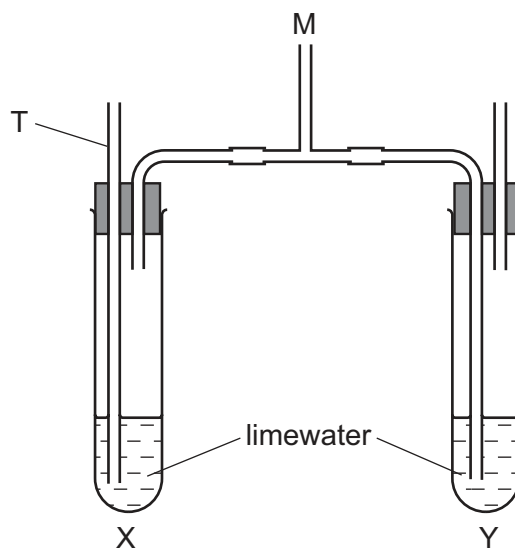
33 The table shows substances that pass between capillaries and tissues in a part of the body.

substance	into the capillaries from the tissues	out of the capillaries into the tissues
oxygen		✓
carbon dioxide	✓	
amino acids		✓
urea	✓	

In which part of the body are these capillaries?

- A between the alveoli
- B in the kidney
- C in the liver
- D in the villi

34 The apparatus shown is used to investigate gas exchange during breathing.



What would occur when a person breathes gently in and out several times through tube M?

- A The solutions in X and Y both turn cloudy.
- B The solution in X remains clear, but that in Y turns cloudy.
- C The solution in X turns cloudy, but that in Y remains clear.
- D The solution in X is forced out through the tube T.

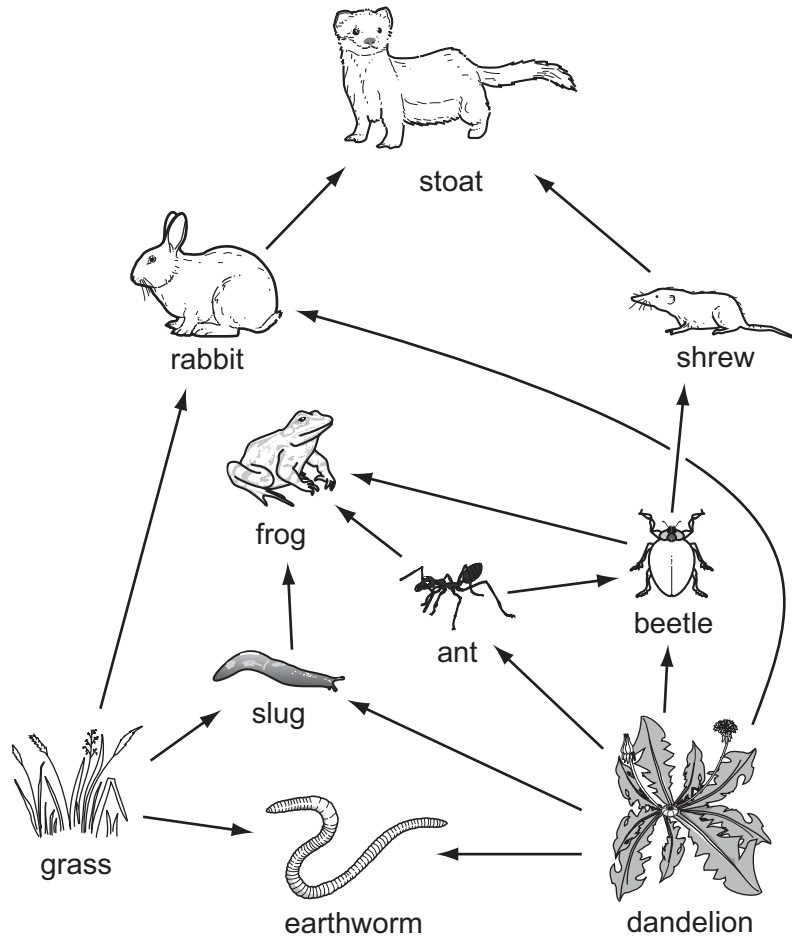
35 Which statement best describes changes in parts of the eye when starting focus on a near object?

- A Ciliary muscles contract, suspensory ligaments loosen and the lens becomes more rounded.
- B Ciliary muscles contract, suspensory ligaments tighten and the lens becomes flatter.
- C Ciliary muscles relax, suspensory ligaments loosen and the lens becomes more rounded.
- D Ciliary muscles relax, suspensory ligaments tighten and the lens becomes flatter.

36 Which descriptions of drugs are correct?

	have side effects	are broken down by the liver
A	x	x
B	x	✓
C	✓	x
D	✓	✓

37 The diagram shows part of the food web.



Which organism can properly be described by **only one** of the terms producer, consumer, herbivore and carnivore?

- A ant
- B dandelion
- C frog
- D stoat

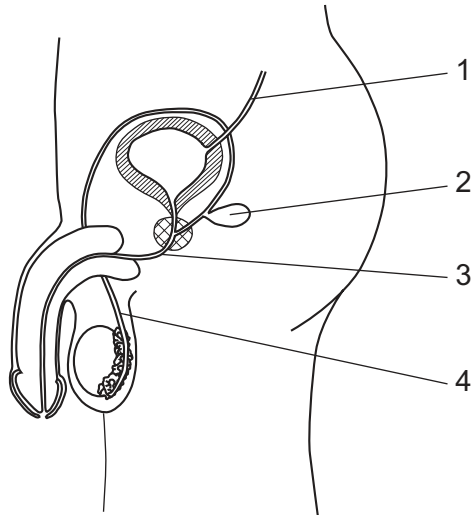
38 What increases in the long term as a result of tropical deforestation?

- A cloud cover
- B humidity
- C soil erosion
- D soil fertility

39 What is always true of the offspring from asexual reproduction in plants?

- A a new variety
- B more resistant to disease
- C same flower shape
- D same size

40 The diagram shows the male reproductive system.



How could surgical contraception be carried out?

- A cutting and tying tube 1
- B cutting and tying tube 3
- C cutting and tying tube 4
- D removing gland 2

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

		Group																																																																																						
		I	II	III	IV	V	VI	VII	VIII	IX	X																																																																													
		1 <b>H</b> Hydrogen 1																																																																																						
		4 <b>He</b> Helium 2																																																																																						
7	9	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20																																																																					
<b>Li</b> Lithium	<b>Be</b> Beryllium	<b>B</b> Boron	<b>C</b> Carbon	<b>N</b> Nitrogen	<b>O</b> Oxygen	<b>F</b> Fluorine	<b>Ne</b> Neon	<b>Na</b> Sodium	<b>Mg</b> Magnesium	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus	<b>S</b> Sulfur	<b>Cl</b> Chlorine	<b>Ar</b> Argon	<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium	<b>Cr</b> Chromium	<b>Mn</b> Manganese	<b>Fe</b> Iron	<b>Co</b> Cobalt	<b>Ni</b> Nickel	<b>Cu</b> Copper	<b>Zn</b> Zinc	<b>Ga</b> Gallium	<b>Ge</b> Germanium	<b>As</b> Arsenic	<b>Se</b> Selenium	<b>Br</b> Bromine	<b>Kr</b> Krypton																																																							
11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54																																													
<b>Na</b> Sodium	<b>Mg</b> Magnesium	<b>Al</b> Aluminium	<b>Si</b> Silicon	<b>P</b> Phosphorus	<b>S</b> Sulfur	<b>Cl</b> Chlorine	<b>Ar</b> Argon	<b>K</b> Potassium	<b>Ca</b> Calcium	<b>Sc</b> Scandium	<b>Ti</b> Titanium	<b>V</b> Vanadium	<b>Cr</b> Chromium	<b>Mn</b> Manganese	<b>Fe</b> Iron	<b>Co</b> Cobalt	<b>Ni</b> Nickel	<b>Cu</b> Copper	<b>Zn</b> Zinc	<b>Ga</b> Gallium	<b>Ge</b> Germanium	<b>As</b> Arsenic	<b>Se</b> Selenium	<b>Br</b> Bromine	<b>Kr</b> Krypton	<b>Rb</b> Rubidium	<b>Sr</b> Strontium	<b>Y</b> Yttrium	<b>Zr</b> Zirconium	<b>Nb</b> Niobium	<b>Mo</b> Molybdenum	<b>Tc</b> Technetium	<b>Ru</b> Ruthenium	<b>Rh</b> Rhodium	<b>Pd</b> Palladium	<b>Ag</b> Silver	<b>Cd</b> Cadmium	<b>In</b> Indium	<b>Sn</b> Tin	<b>Sb</b> Antimony	<b>Te</b> Tellurium	<b>I</b> Iodine	<b>Xe</b> Xenon																																													
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<b>Rb</b> Rubidium	<b>Sr</b> Strontium	<b>Y</b> Yttrium	<b>Zr</b> Zirconium	<b>Nb</b> Niobium	<b>Mo</b> Molybdenum	<b>Tc</b> Technetium	<b>Ru</b> Ruthenium	<b>Rh</b> Rhodium	<b>Pd</b> Palladium	<b>Ag</b> Silver	<b>Cd</b> Cadmium	<b>In</b> Indium	<b>Sn</b> Tin	<b>Sb</b> Antimony	<b>Te</b> Tellurium	<b>I</b> Iodine	<b>Xe</b> Xenon	<b>Cs</b> Caesium	<b>Ba</b> Barium	<b>La</b> Lanthanum	<b>Ce</b> Cerium	<b>Pr</b> Praseodymium	<b>Nd</b> Neodymium	<b>Pm</b> Promethium	<b>Sm</b> Samarium	<b>Eu</b> Europium	<b>Gd</b> Gadolinium	<b>Tb</b> Terbium	<b>Dy</b> Dysprosium	<b>Ho</b> Holmium	<b>Er</b> Erbium	<b>Tm</b> Thulium	<b>Yb</b> Ytterbium	<b>Lu</b> Lutetium	<b>Hf</b> Hafnium	<b>Ta</b> Tantalum	<b>W</b> Tungsten	<b>Re</b> Rhenium	<b>Os</b> Osmium	<b>Ir</b> Iridium	<b>Pt</b> Platinum	<b>Au</b> Gold	<b>Hg</b> Mercury	<b>Tl</b> Thallium	<b>Pb</b> Lead	<b>Bi</b> Bismuth	<b>Po</b> Polonium	<b>At</b> Astatine	<b>Rn</b> Radon																																							
87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
<b>Fr</b> Francium	<b>Ra</b> Radium	<b>Ac</b> Actinium	<b>Th</b> Thorium	<b>Pa</b> Protactinium	<b>U</b> Uranium	<b>Np</b> Neptunium	<b>Pu</b> Plutonium	<b>Am</b> Americium	<b>Cm</b> Curium	<b>Bk</b> Berkelium	<b>Cf</b> Californium	<b>Es</b> Einsteinium	<b>Fm</b> Fermium	<b>Md</b> Mendelevium	<b>No</b> Nobelium	<b>Lr</b> Lawrencium	<b>Ce</b> Cerium	<b>Pr</b> Praseodymium	<b>Nd</b> Neodymium	<b>Pm</b> Promethium	<b>Sm</b> Samarium	<b>Eu</b> Europium	<b>Gd</b> Gadolinium	<b>Tb</b> Terbium	<b>Dy</b> Dysprosium	<b>Ho</b> Holmium	<b>Er</b> Erbium	<b>Tm</b> Thulium	<b>Yb</b> Ytterbium	<b>Lu</b> Lutetium	<b>Hf</b> Hafnium	<b>Ta</b> Tantalum	<b>W</b> Tungsten	<b>Re</b> Rhenium	<b>Os</b> Osmium	<b>Ir</b> Iridium	<b>Pt</b> Platinum	<b>Au</b> Gold	<b>Hg</b> Mercury	<b>Tl</b> Thallium	<b>Pb</b> Lead	<b>Bi</b> Bismuth	<b>Po</b> Polonium	<b>At</b> Astatine	<b>Rn</b> Radon																																											

\*58-71 Lanthanoid series  
†90-103 Actinoid series

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

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

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