



MINISTRY OF EDUCATION, SINGAPORE  
in collaboration with  
CAMBRIDGE ASSESSMENT INTERNATIONAL EDUCATION  
General Certificate of Education Ordinary Level

## SCIENCE (CHEMISTRY, BIOLOGY)

5088/01

Paper 1 Multiple Choice

For examination from 2024

SPECIMEN PAPER

1 hour

Additional Materials: Multiple Choice Answer Sheet



### READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Write your name, Centre number and index number on the Answer Sheet in the spaces provided unless this has been done for you.

Do not use staples, paper clips, glue or correction fluid.

DO **NOT** WRITE ON ANY BARCODES.

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 Data Sheet is printed on page 21.

A copy of the Periodic Table is printed on page 22.

The use of an approved scientific calculator is expected, where appropriate.

This document consists of **21** printed pages and **1** blank page.

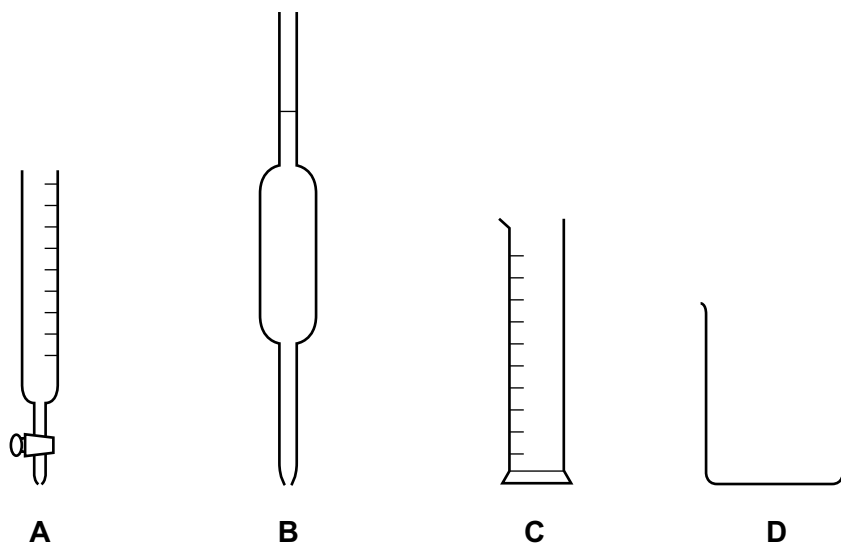


Singapore Examinations and Assessment Board

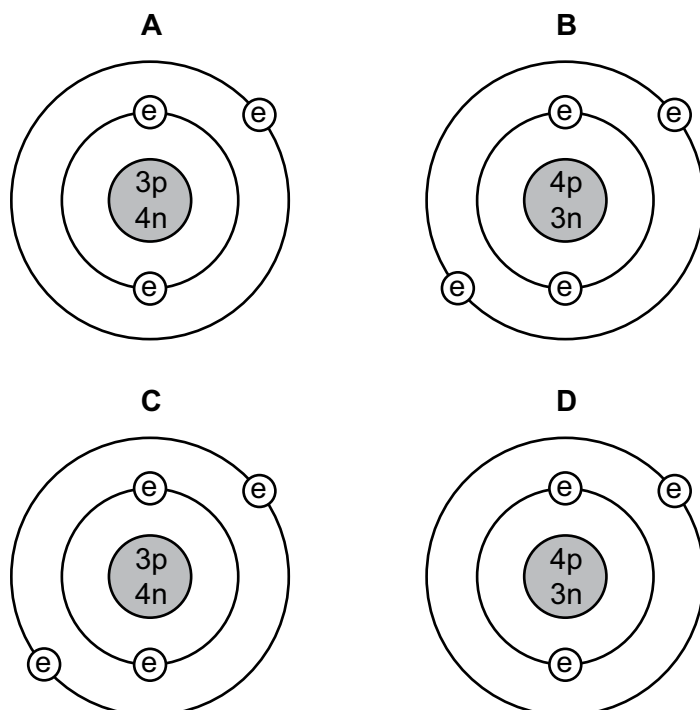


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International Education

- 1 Which apparatus would be most suitable to measure accurately the volume of acid needed to neutralise  $25.0\text{ cm}^3$  of an alkali? The apparatus are not drawn to scale.



- 2 Which diagram shows the structure of a  ${}^7_3\text{Li}$  atom?



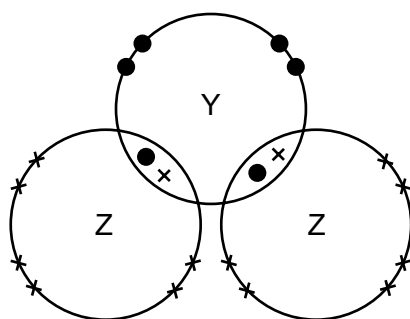
key  
 p = proton  
 n = neutron  
 e = electron

- 3 The elements X and Y form the compound  $X_2Y$ .

What is the electronic configuration of the atoms X and Y?

	electronic configuration	
	atom of X	atom of Y
<b>A</b>	2,1	2,7
<b>B</b>	2,2	2,7
<b>C</b>	2,1	2,6
<b>D</b>	2,2	2,6

- 4 The diagram shows the arrangement of electrons in a molecule of compound  $YZ_2$ .



key

- outer electron of a Y atom
- × outer electron of a Z atom

What are elements Y and Z?

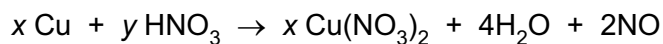
	Y	Z
<b>A</b>	calcium	chlorine
<b>B</b>	carbon	oxygen
<b>C</b>	oxygen	hydrogen
<b>D</b>	sulfur	chlorine

- 5 Brass is an alloy of copper and zinc.

Which statement is correct?

- A** Brass can be represented by a chemical formula.
- B** Brass is formed by a chemical reaction between copper and zinc.
- C** Brass will react completely with dilute hydrochloric acid.
- D** The zinc in brass will react with dilute hydrochloric acid.

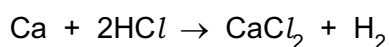
- 6 The equation represents the reaction between dilute nitric acid and copper.



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

- A  $x = 1, y = 4$
- B  $x = 1, y = 8$
- C  $x = 3, y = 4$
- D  $x = 3, y = 8$

- 7 Calcium reacts with dilute hydrochloric acid.



What volume of  $1.0 \text{ mol/dm}^3$  hydrochloric acid is required to react completely with 5 g of calcium?

- A  $0.125 \text{ dm}^3$
  - B  $0.250 \text{ dm}^3$
  - C  $0.5 \text{ dm}^3$
  - D  $10 \text{ dm}^3$
- 8 An aqueous solution of the organic compound methylamine has a pH greater than 7.
- Which statement about methylamine is correct?
- A It neutralises an aqueous solution of sodium hydroxide.
  - B It reacts with copper(II) carbonate to give carbon dioxide.
  - C It reacts with hydrochloric acid to form a salt.
  - D It turns Universal Indicator red.
- 9 Which pair of substances reacts to form a salt and water only?
- A aqueous sodium chloride and silver nitrate solution
  - B aqueous sodium hydroxide and dilute hydrochloric acid
  - C aqueous sodium carbonate and dilute sulfuric acid
  - D zinc and dilute hydrochloric acid

- 10 A student adds aqueous sodium hydroxide and aqueous ammonia separately to solutions of four different metal compounds.

Which solution contains  $\text{Zn}^{2+}$  ions?

solution	add a few drops of $\text{NaOH}(\text{aq})$	add excess $\text{NaOH}(\text{aq})$	add a few drops of $\text{NH}_3(\text{aq})$	add excess $\text{NH}_3(\text{aq})$
<b>A</b>	ppt	ppt dissolves	ppt	ppt dissolves
<b>B</b>	ppt	ppt dissolves	ppt	ppt remains
<b>C</b>	ppt	ppt remains	no ppt	no ppt
<b>D</b>	no ppt	no ppt	no ppt	no ppt

- 11 Which reaction is **not** a redox reaction?

- A**  $\text{CH}_4(\text{g}) + 2\text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$   
**B**  $\text{Cu}^{2+}(\text{aq}) + \text{Zn}(\text{s}) \rightarrow \text{Cu}(\text{s}) + \text{Zn}^{2+}(\text{aq})$   
**C**  $\text{CuO}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{CuSO}_4(\text{aq}) + \text{H}_2\text{O}(\text{l})$   
**D**  $\text{Zn}(\text{s}) + \text{H}_2\text{SO}_4(\text{aq}) \rightarrow \text{ZnSO}_4(\text{aq}) + \text{H}_2(\text{g})$

- 12 Many properties of an element and its compounds can be predicted from the position of the element in the Periodic Table.

What property could **not** be predicted in this way?

- A** the acidic or basic nature of its oxide  
**B** the formula of its oxide  
**C** the number of isotopes it has  
**D** its metallic or non-metallic properties

13 Elements X and Y are in Group 17 of the Periodic Table.

X is a liquid at room temperature. Y is a solid at room temperature.

- 1 Atoms of Y have more protons than atoms of X.
- 2 Molecules of Y have more atoms than molecules of X.
- 3 Y displaces X from aqueous solutions of  $X^-$  ions.

Which statements are correct?

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

14 Metal M is extracted from its oxide by heating the oxide with carbon.

Iron reacts slowly with steam, and metal M reacts very slowly with steam. Sodium reacts vigorously with cold water.

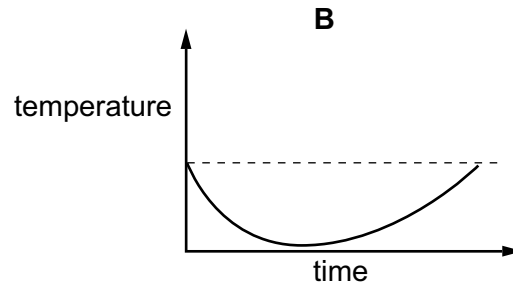
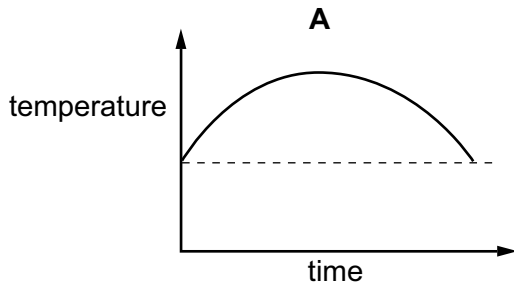
What is the order of reactivity of the above metals and copper?

	least reactive $\longrightarrow$ most reactive			
<b>A</b>	sodium	metal M	iron	copper
<b>B</b>	sodium	iron	metal M	copper
<b>C</b>	copper	iron	metal M	sodium
<b>D</b>	copper	metal M	iron	sodium

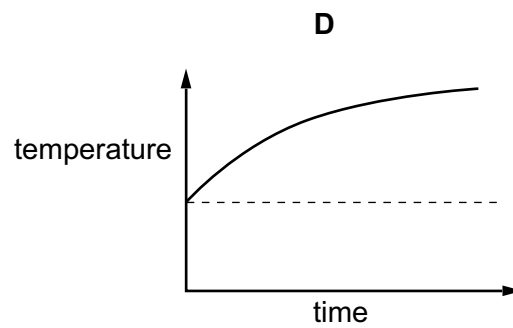
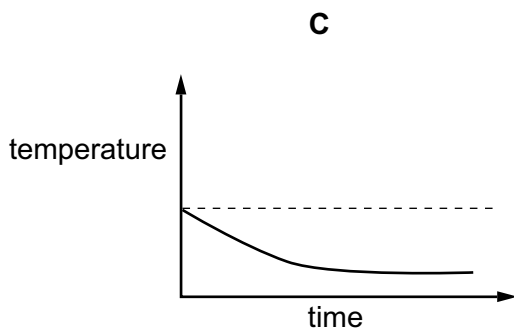
15 Ammonium nitrate dissolving in water is endothermic.

When ammonium nitrate is added to water and the solution formed is allowed to stand for several minutes, the temperature changes.

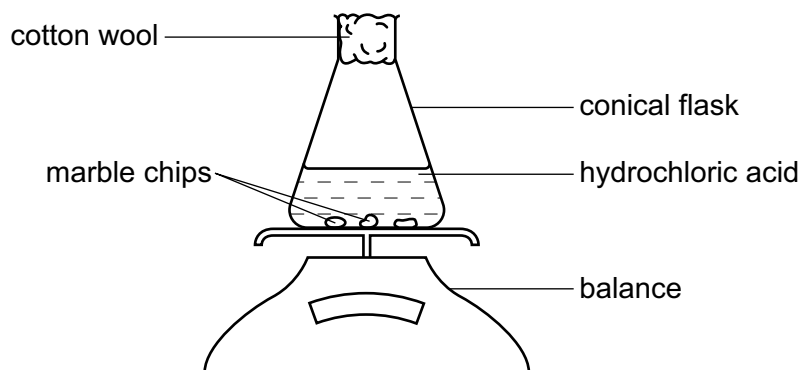
Which graph shows how the temperature changes?



key  
--- room temperature



16 Two experiments are carried out using the apparatus shown.

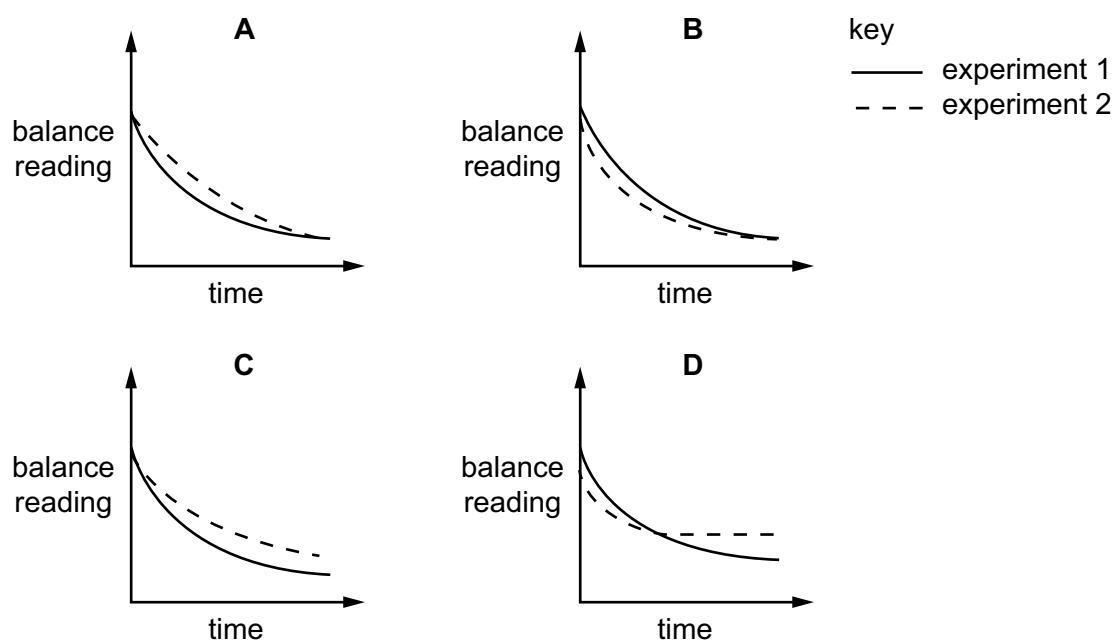


In experiment 1, dilute hydrochloric acid is used.

In experiment 2, concentrated hydrochloric acid is used.

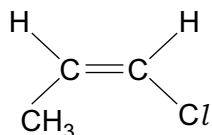
In both experiments, all the marble chips react completely and all the other conditions are kept the same.

Which diagram shows the results obtained?

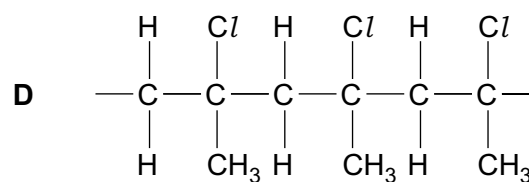
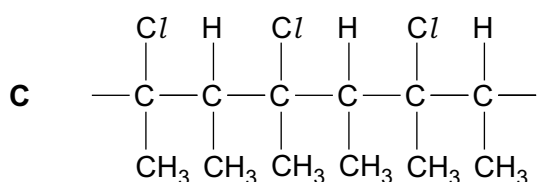
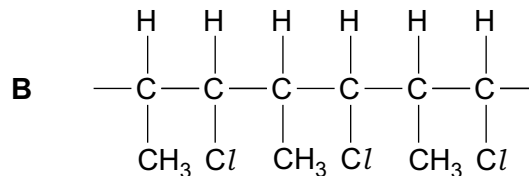
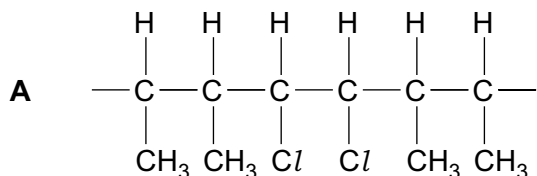




17 The structure shows a monomer.

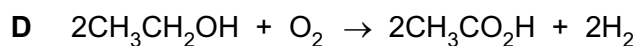
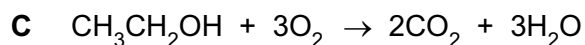
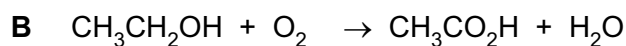


Which structure shows a part of the polymer chain formed from **three** molecules of the monomer?



18 When ethanol is left standing in the air for some time, it becomes acidic.

Which equation represents this change?



19 Which statements about alkanes are correct?

- 1 They undergo addition reactions with chlorine.
- 2 The viscosity increases as the relative molecular mass increases.
- 3 They form carbon monoxide when they burn in a limited supply of oxygen.
- 4 They are unsaturated hydrocarbons.

**A** 1 and 3

**B** 1 and 4

**C** 2 and 3

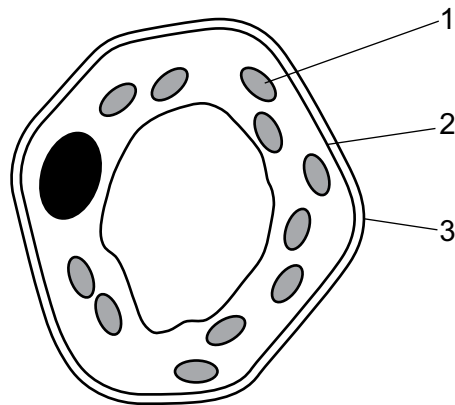
**D** 2 and 4

20 Which statements about air pollutants are correct?

- 1 Carbon monoxide is responsible for the production of 'acid rain'.
- 2 Oxides of nitrogen are present in car exhausts.
- 3 Nitrogen dioxide forms acid rain which can corrode buildings.

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

21 The diagram shows a plant cell as seen under a light microscope.



What are the functions of the numbered parts in the cell?

	control of entry of substances	synthesis of carbohydrates
<b>A</b>	1	3
<b>B</b>	2	1
<b>C</b>	3	2
<b>D</b>	3	1

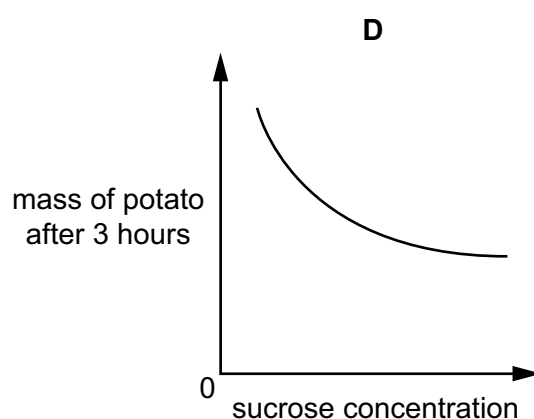
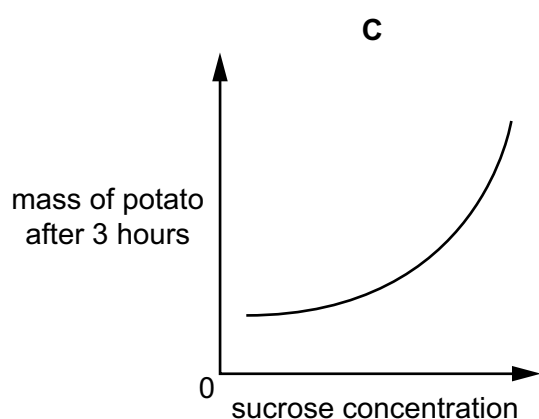
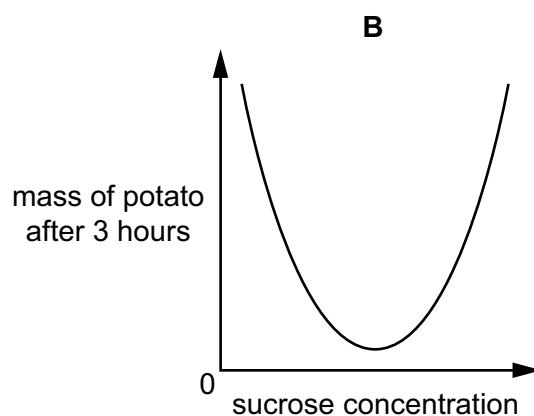
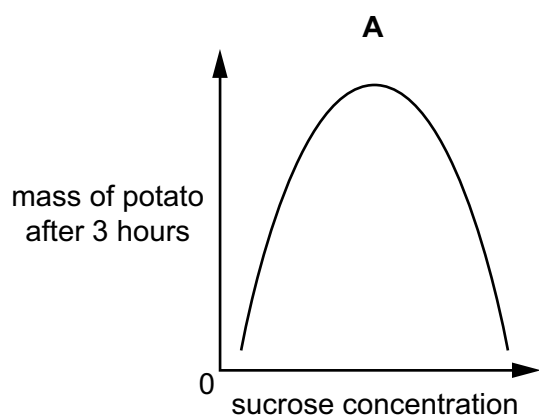
22 The table shows the main functions of red blood cells and root hair cells.

Which row is correct?

	red blood cells	root hair cells
<b>A</b>	absorption	absorption
<b>B</b>	absorption	transport
<b>C</b>	transport	absorption
<b>D</b>	transport	transport

23 An experiment was carried out to determine the effect of sucrose concentration on the mass of potato pieces. Identical pieces of potato were placed in sucrose solutions of different concentrations. After three hours, the mass of each potato piece was measured.

Which graph best shows the results of this experiment?



- 24 A sample of food mixed with water is tested to find out its contents. The results are shown in the table.

test	result
iodine solution added	yellow colour
Benedict's solution is added and the mixture is heated	red precipitate
shaken with ethanol and water	white emulsion
biuret test	blue colour

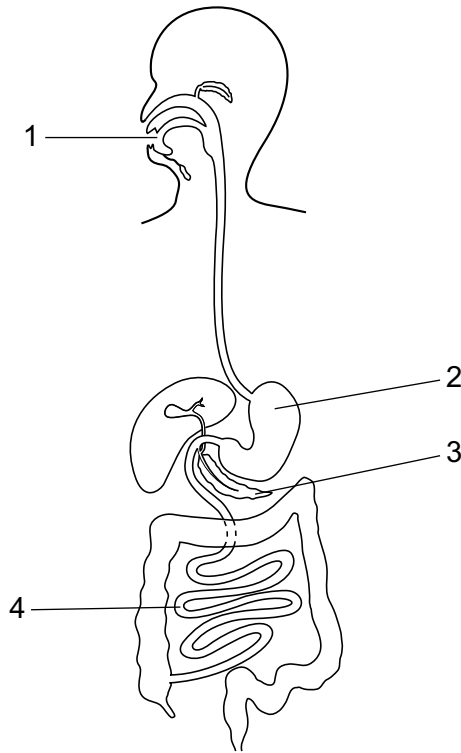
Which nutrient or nutrients are present in the food?

- A fat and reducing sugar
  - B fat and starch
  - C protein
  - D reducing sugar only
- 25 Which word completes the sentence?

In humans, large, insoluble molecules have to be digested before they can be .....

- A absorbed
- B egested
- C ingested
- D transpired

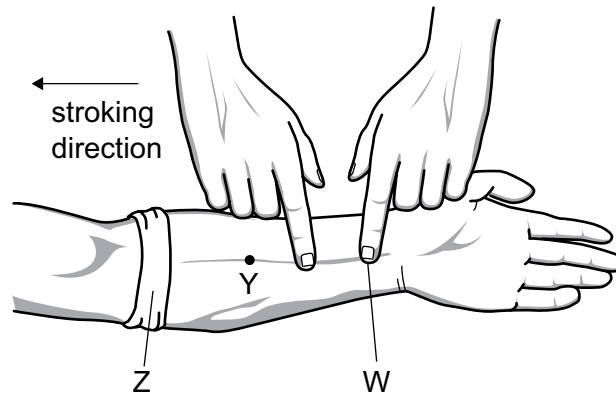
26 The diagram shows the human digestive system.



In which regions does amylase act?

- A 1 and 3
- B 1 and 4
- C 2 and 3
- D 2 and 4

27 The diagram shows an investigation of blood flow in the veins of the lower arm.



A cloth is tightly wrapped round the arm at point Z and the veins in the lower arm bulge clearly. One finger then presses on one of these veins at W.

When another finger strokes the vein in the direction shown in the diagram, the vein lies flat between points W and Y.

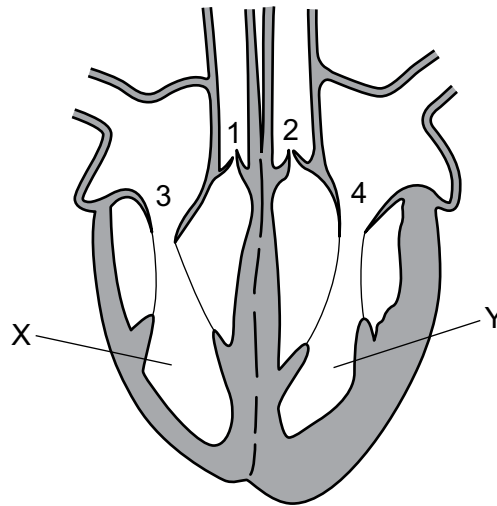
Some possible explanations are listed.

- 1 The bandage at Z prevents backflow of blood.
- 2 The finger pressed at W prevents more blood entering the vein.
- 3 A valve at Y prevents backflow.
- 4 A valve at Z prevents more blood from entering the vein.

Which explanations about why the vein lies flat are correct?

- A** 1 and 2      **B** 1 and 4      **C** 2 and 3      **D** 2 and 4

28 The diagram shows a section through the heart.



While blood is leaving chambers X and Y, which valves are open and which are closed?

	valves 1 and 2	valves 3 and 4
<b>A</b>	closed	closed
<b>B</b>	closed	open
<b>C</b>	open	closed
<b>D</b>	open	open

29 Fitness training increases the concentration of lactic acid that runners can tolerate in their muscles.

What is happening in the muscles of these runners?

- A** Aerobic respiration in the muscles occurs more quickly.
- B** Blood flow to the muscles is decreased.
- C** More anaerobic respiration takes place in the muscles.
- D** More carbon dioxide is released by the muscles.

30 Which is a common symptom of **both** influenza and pneumococcal disease?

- A** fever
- B** nausea
- C** runny nose
- D** skin rash

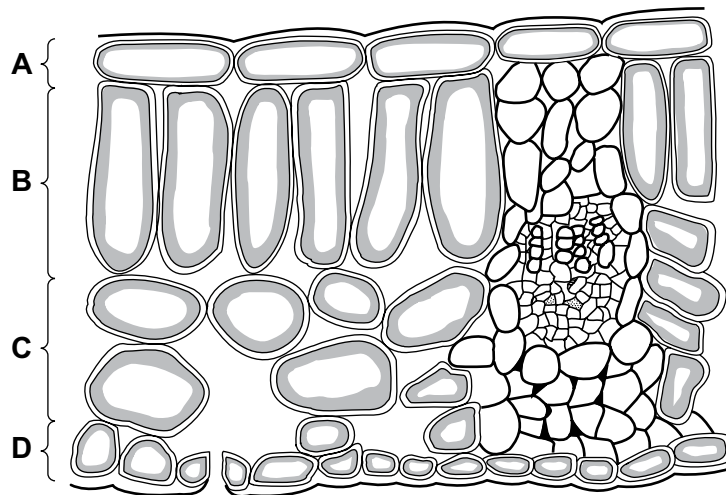
- 31 Vaccines contain an agent that resembles a pathogen and prevent infectious diseases by stimulating ..... **S** ..... to quickly produce ..... **T** ..... when the pathogen invades.

Which row contains the correct words to fill the gaps **S** and **T**?

	<b>S</b>	<b>T</b>
<b>A</b>	red blood cells	antibiotics
<b>B</b>	red blood cells	antibodies
<b>C</b>	white blood cells	antibiotics
<b>D</b>	white blood cells	antibodies

- 32 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?



- 33 Which substances are transported in the phloem and in the xylem?

	phloem	xylem
<b>A</b>	amino acids and water	amino acids and mineral ions
<b>B</b>	starch and mineral ions	mineral ions and sucrose
<b>C</b>	sucrose and amino acids	mineral ions and water
<b>D</b>	sucrose and starch	starch and water



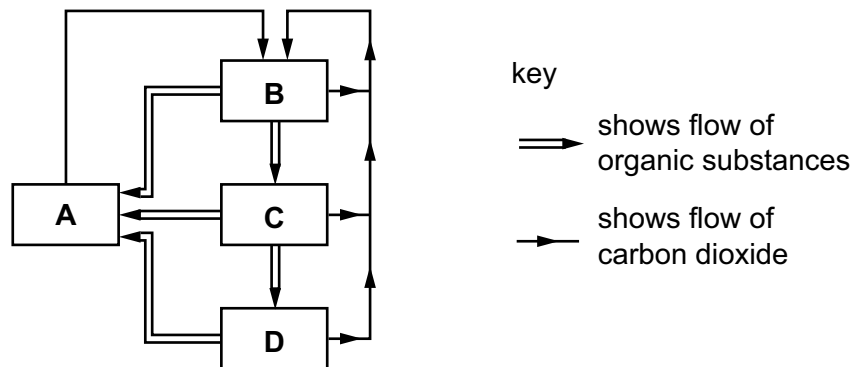
- 34 Some organisms live in the dark at the bottom of the seas and, to synthesise glucose, use energy from chemicals in the very hot water that comes out of volcanoes.

Which statement best describes these organisms?

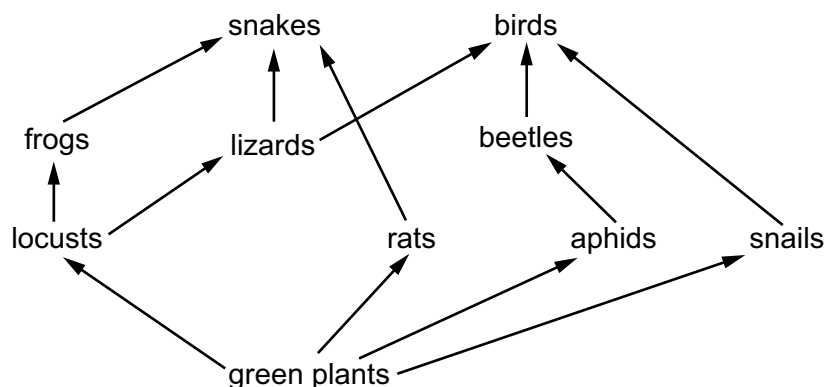
- A Their enzymes are easily denatured by heat.
  - B They do not contain chlorophyll.
  - C They obtain energy only through feeding on other organisms.
  - D They synthesise glucose through photosynthesis.
- 35 The diagram represents the flow of substances within a balanced ecosystem.

The boxes are various trophic levels.

Which box represents decomposers?



- 36 The diagram shows a food web in a tropical forest.



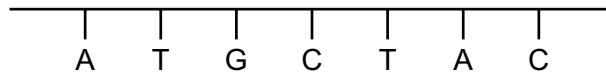
At which trophic level are the lizards in this food web?

- A decomposers
- B primary consumers
- C producers
- D secondary consumers

37 Which statement about chromosomes is correct?

- A Chromosomes are long DNA molecules called genes which are divided into sections.
- B Chromosomes include a long molecule of DNA divided into sections called genes.
- C Genes are divided into sections called chromosomes.
- D Genes include long DNA molecules called chromosomes.

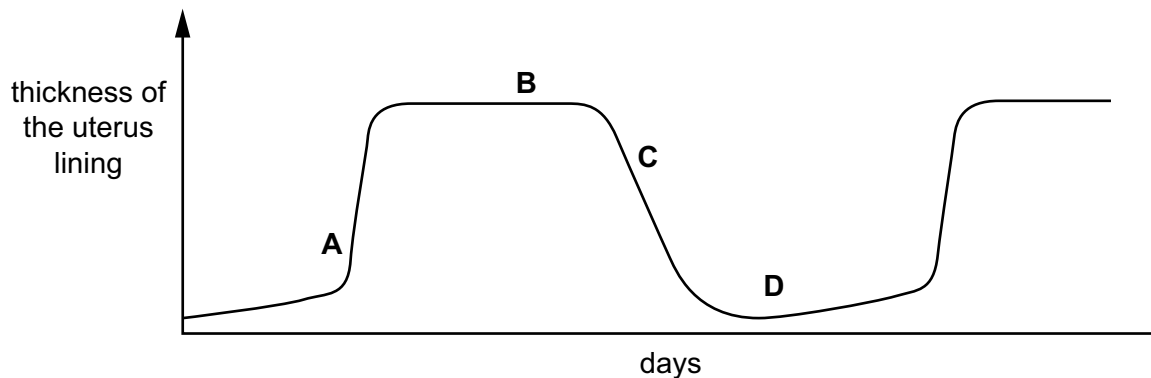
38 The diagram below shows a section of DNA.



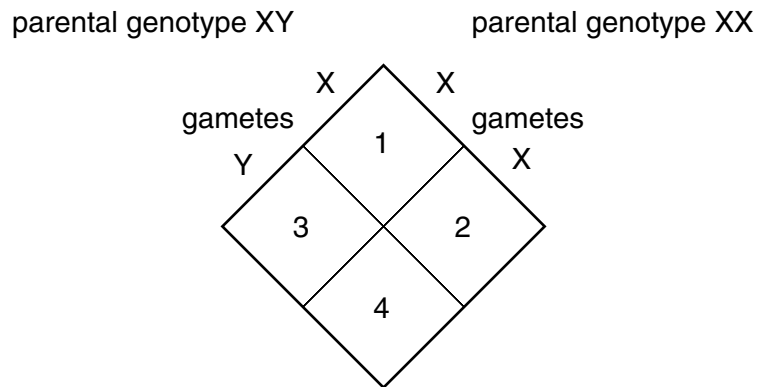
Which row has the correct complementary DNA base sequence?

- A TACCATG
  - B GCATCGT
  - C TACGATG
  - D CGTAGCA
- 39 The diagram shows the changes in the thickness of the uterus lining of a woman during her menstrual cycle.

At which time would a fertilised egg implant?



40 The diagram shows the sex determination of offspring in humans.



Which sexes are the offspring in boxes 1, 2, 3 and 4?

	1	2	3	4
A	male	female	male	female
B	male	female	female	male
C	female	male	female	male
D	female	female	male	male



## Data Sheet

## Colours of Some Common Metal Hydroxides

aluminium hydroxide	white
calcium hydroxide	white
copper(II) hydroxide	light blue
iron(II) hydroxide	green
iron(III) hydroxide	red-brown
zinc hydroxide	white

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## The Periodic Table of Elements

Group																											
1	2	Key												13	14	15	16	17	18								
		1	proton (atomic) number atomic symbol name relative atomic mass																								
		1	H hydrogen 1																								
3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18												
Li lithium 7	Be beryllium 9	B boron 11	C carbon 12	N nitrogen 14	O oxygen 16	F fluorine 19	Ne neon 20	Na sodium 23	Mg magnesium 24	Al aluminium 27	Si silicon 28	P phosphorus 31	S sulfur 32	Cl chlorine 35.5	Ar argon 40												
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36										
K potassium 39	Ca calcium 40	Sc scandium 45	Ti titanium 48	V vanadium 51	Cr chromium 52	Mn manganese 55	Fe iron 56	Co cobalt 59	Ni nickel 59	Cu copper 64	Zn zinc 65	Ga gallium 70	Ge germanium 73	As arsenic 75	Se selenium 79	Br bromine 80	Kr krypton 84										
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54										
Rb rubidium 85	Sr strontium 88	Y yttrium 89	Zr zirconium 91	Nb niobium 93	Mo molybdenum 96	Tc technetium —	Ru ruthenium 101	Rh rhodium 103	Pd palladium 106	Ag silver 108	Cd cadmium 112	In indium 115	Sn tin 119	Sb antimony 122	Te tellurium 128	I iodine 127	Xe xenon 131										
55	56	57–71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86										
Cs caesium 133	Ba barium 137	lanthanoids	Hf hafnium 178	Ta tantalum 181	W tungsten 184	Re rhenium 186	Os osmium 190	Ir iridium 192	Pt platinum 195	Au gold 197	Hg mercury 201	Tl thallium 204	Pb lead 207	Bi bismuth 209	Po polonium —	At astatine —	Rn radon —										
87	88	89–103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118										
Fr francium —	Ra radium —	actinoids	Rf rutherfordium —	Db dubnium —	Sg seaborgium —	Bh bohrium —	Hs hassium —	Mt meitnerium —	Ds darmstadtium —	Rg roentgenium —	Cn copernicium —	Nh nihonium —	Fl flerovium —	Mc moscovium —	Lv livermorium —	Ts tennessine —	Og oganesson —										
lanthanoids		57	58	59	60	61	62	63	64	65	66	67	68	69	70	71											
		La lanthanum 139	Ce cerium 140	Pr praseodymium 141	Nd neodymium 144	Pm promethium —	Sm samarium 150	Eu europium 152	Gd gadolinium 157	Tb terbium 159	Dy dysprosium 163	Ho holmium 165	Er erbium 167	Tm thulium 169	Yb ytterbium 173	Lu lutetium 175											
actinoids		89	90	91	92	93	94	95	96	97	98	99	100	101	102	103											
		Ac actinium —	Th thorium 232	Pa protactinium 231	U uranium 238	Np neptunium —	Pu plutonium —	Am americium —	Cm curium —	Bk berkelium —	Cf californium —	Es einsteinium —	Fm fermium —	Md mendelevium —	No nobelium —	Lr lawrencium —											

The volume of one mole of any gas is  $24 \text{ dm}^3$  at room temperature and pressure (r.t.p.).  
The Avogadro constant,  $L = 6.02 \times 10^{23} \text{ mol}^{-1}$ .