UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

ADDITIONAL COMBINED SCIENCE **5130/01**

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.

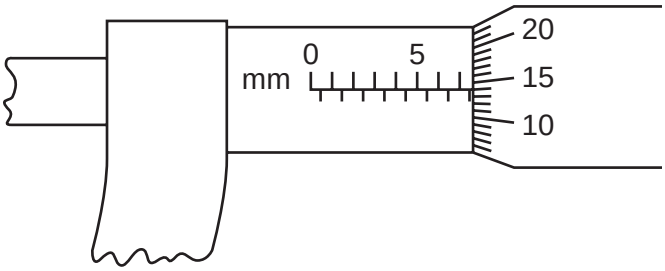
There are **forty** questions on this paper. Answer **all** questions.
For each question there are four possible answers **A**, **B**, **C** and **D**. Choose the **one** you consider correct and record your choice in **soft pencil** on the separate answer sheet.

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 scale.

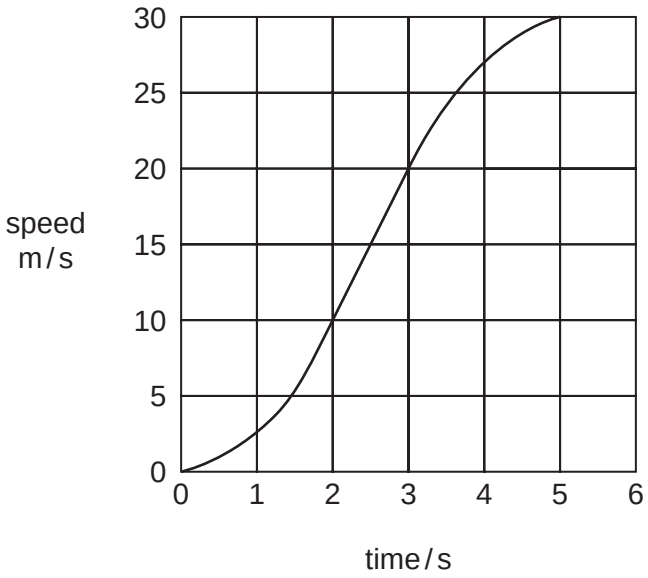


Which reading is shown?

A 5.64 mm **B** 7.14 mm **C** 7.16 mm **D** 7.64 mm

2 The graph shows the speed of a car as it accelerates from rest.

During part of this time the acceleration is uniform.

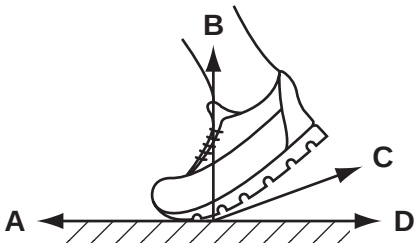


What is the size of this uniform acceleration?

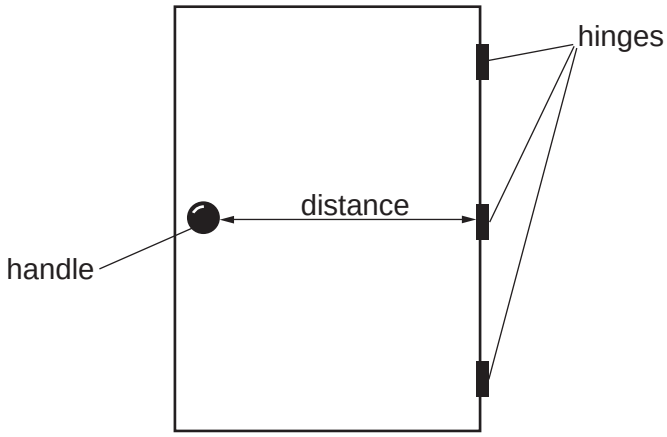
A 5 m/s^2 **B** 6 m/s^2 **C** 10 m/s^2 **D** 20 m/s^2

3 The drawing shows a sprinter's shoe during a race.

Which arrow indicates the direction of the force of friction acting on the sprinter's shoe?



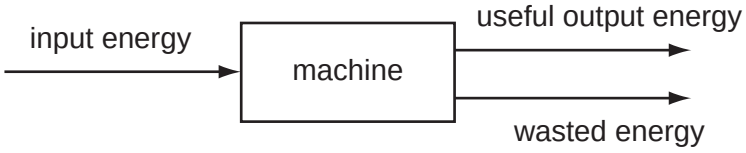
4 A door requires a minimum moment of 32.5 N m in order to open it.



What is the minimum distance of the handle from the hinges, if the door is to be pulled open with a force at the handle of 50 N?

A 0.33 m **B** 0.65 m **C** 0.77 m **D** 1.54 m

5 The diagram shows energy transfer through a machine.



What is the efficiency of the machine?

A $\frac{\text{input}}{\text{useful output energy}}$

B $\frac{\text{useful output energy}}{\text{input energy}}$

C $\frac{\text{useful output energy}}{\text{wasted energy}}$

D $\frac{\text{wasted energy}}{\text{input energy}}$

6 A clinical thermometer is placed in a person's mouth and then removed to read the temperature.

Why is a clinical thermometer more suitable than a laboratory thermometer for this purpose?

A It has a larger range.

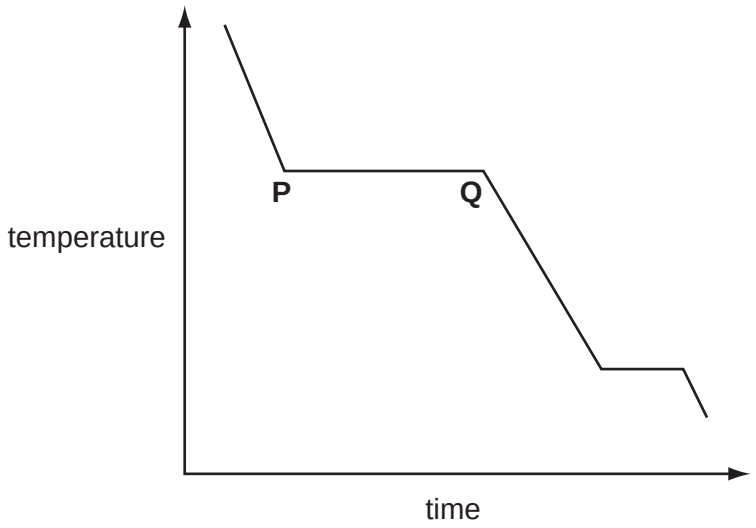
B It has a linear scale.

C It has a steady reading.

D It has a wider bore.

7 A substance was heated in an enclosed space until it became a gas.

After the heater was removed, the temperature was recorded at regular intervals. The graph shows temperature plotted against time.



What does the section **PQ** represent?

A boiling

B condensing

C melting

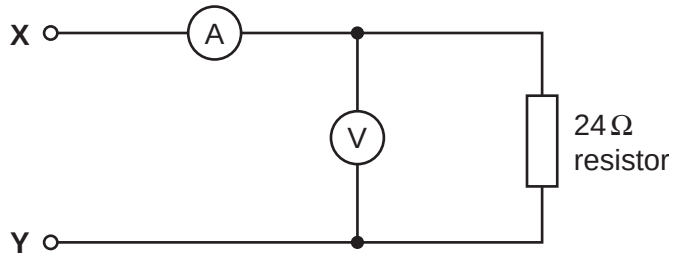
D solidifying

8 A ray of light travels from air into glass. The refractive index of the glass is 1.5 .

Which of the following pairs could be values of the angle of incidence and the angle of refraction?

	angle of incidence	angle of refraction
A	21.5°	20.0°
B	40.0°	30.0°
C	60.0°	35.3°
D	80.0°	53.3°

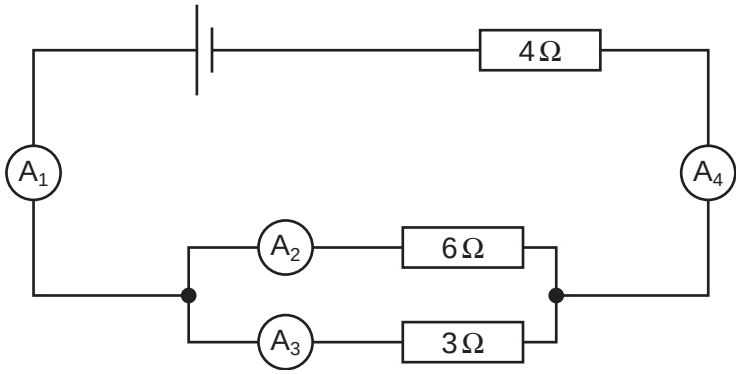
9 The diagram shows an electric circuit.



Which two readings are obtained when a suitable power supply is connected to **X** and **Y**?

	voltmeter reading	ammeter reading
A	2 V	6 A
B	6 V	0.5 A
C	12 V	0.5 A
D	12 V	2 A

10 The diagram shows a circuit. The reading of ammeter A_2 is 1A and of A_4 is 3A.



What are the readings of ammeters A_1 and A_3?

	A_1	A_3
A	1.5 A	0.5 A
B	2 A	1 A
C	3 A	1 A
D	3 A	2 A

11 A 2 kW appliance is to be connected to the 240 V mains supply.

Which fuse should be fitted in the plug?

A 1 A **B** 3 A **C** 5 A **D** 10 A

12 What is the relationship between the number of electrons, neutrons and protons in a neutral atom of $^{14}_{6}C$?

A n > p = e

B n = p > e

C n = p < e

D n < p = e

key
n = number of neutrons
p = number of protons
e = number of electrons

13 The table shows the possible properties of radioactive emissions.

Which emission could be a beta-particle?

emission	charged	deflected in a magnetic field	level of ionisation
A	no	yes	none
B	yes	yes	none
C	yes	yes	weak
D	yes	no	weak

14 The following tests were carried out on an aqueous substance **X.**

test	observation
add acidified barium chloride	white precipitate
add aqueous sodium hydroxide	white precipitate

What is **X**?

A aluminium chloride

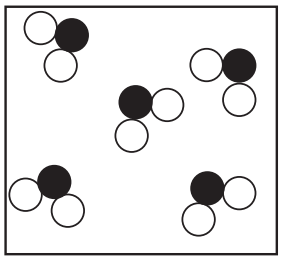
B ammonium chloride

C iron(II) sulphate

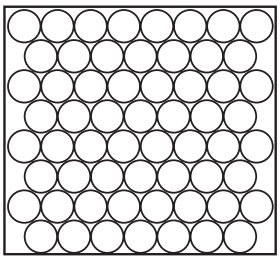
D zinc sulphate

15 Which diagram represents the arrangement of particles in a solution.

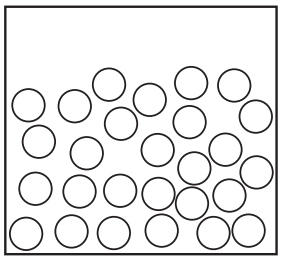
A



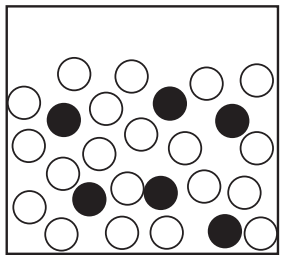
B



C



D



16 The table shows some of the properties of four substances.

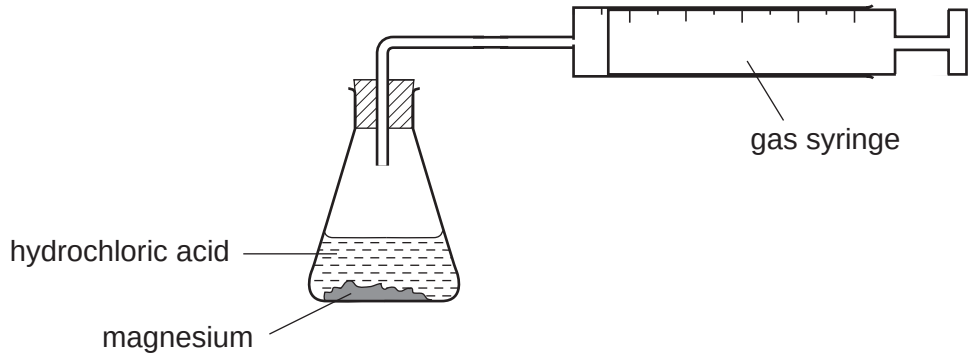
Which substance could be sodium chloride?

	melting point / °C	ability to conduct electricity when liquid	ability to conduct electricity in aqueous solution
A	−114	none	good
B	180	none	(insoluble)
C	808	good	good
D	3550	good	(insoluble)

17 Magnesium reacts with hydrochloric acid as shown in the equation.

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

In an experiment the volume of hydrogen produced was 24 cm^3.



What mass of magnesium was used?

A 24 g **B** 12 g **C** 0.12 g **D** 0.024 g

18 Electrolysis of molten lead(II) bromide gives lead at the cathode.

Why does the lead form?

A Lead(II) bromide decomposes on heating.

B Lead(II) bromide has a low melting point.

C Negative lead ions are discharged at the cathode.

D Positive lead ions are discharged at the cathode.

19 Which process is endothermic?

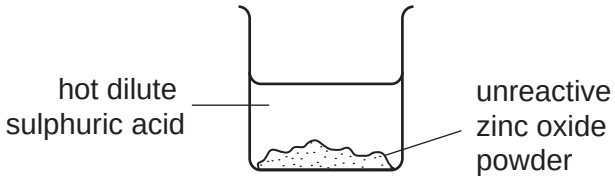
A the formation of a hydrogen-chlorine bond

B the formation of rust

C the formation of water from ice

D the formation of water from oxygen and hydrogen

20 The diagram shows the first step in the preparation of pure, dry crystals of zinc sulphate.



Other steps are: 1 evaporation

2 filtration

3 washing and drying

In which order should these steps be carried out?

A 1 → 2 → 3

B 1 → 3 → 2

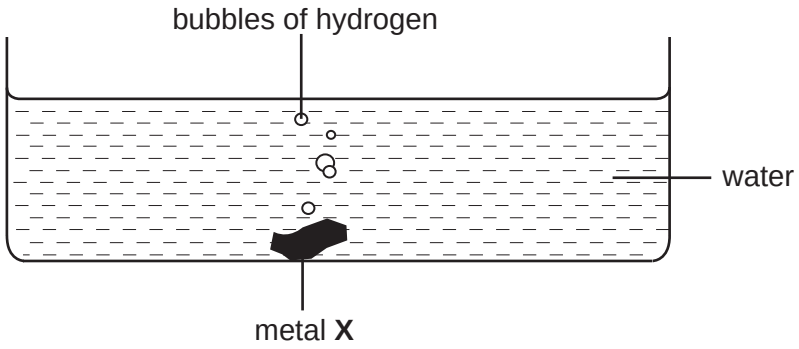
C 2 → 1 → 3

D 2 → 3 → 1

21 Which entry in the table represents an alkali metal?

	melting point	conductivity of the solid	conductivity when molten
A	high	high	low
B	high	low	high
C	low	high	high
D	low	low	low

22 The diagram shows a metal **X** reacting with water.



What is **X**?

A calcium

B copper

C potassium

D sodium

23 What products are formed when limestone is heated?

A lime and carbon dioxide

B lime and water

C lime, carbon dioxide and water

D slaked lime and carbon dioxide

24 Which statement about an homologous series is **not** correct?

All the members of the series have the same

A chemical reactions.

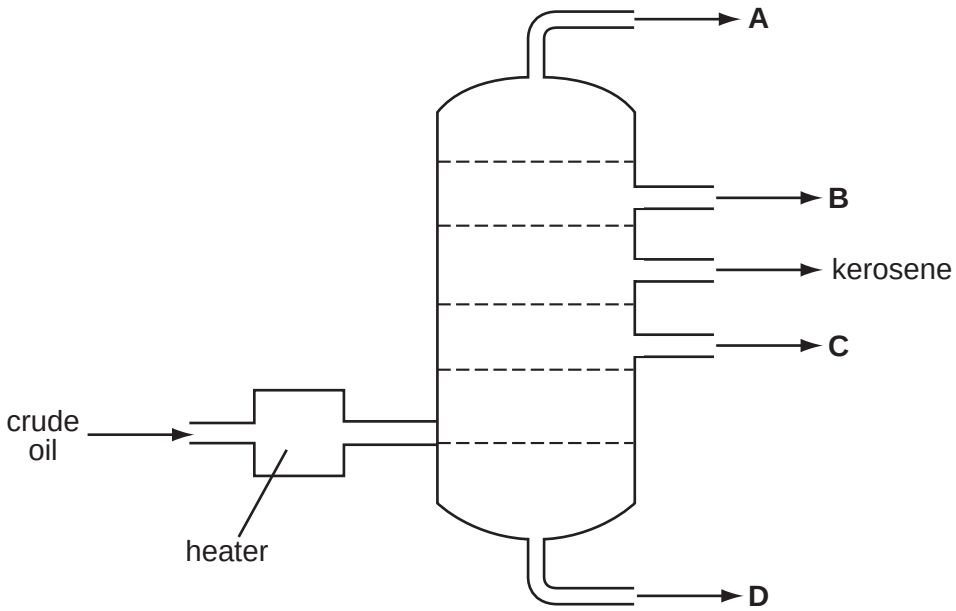
B functional group.

C general formula.

D physical properties.

25 The diagram represents the process of fractional distillation of petroleum.

At which outlet is petrol (gasoline) obtained?



26 Which statement about a compound means that it **must** be an alkane?

A It burns easily in air or in oxygen.

B It contains carbon and hydrogen only.

C It has the general formula C_nH_{2n+2}.

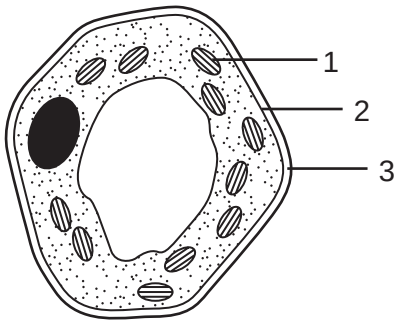
D It is generally unreactive.

27 'The polymer …1… has the same linkages as …2… . It is therefore likely to be …3… by heating with aqueous acids and alkalis.'

Which set of words correctly completes the sentences above?

	1	2	3
A	nylon	proteins	unaffected
B	poly(ethene)	carbohydrates	unaffected
C	starch	esters	unaffected
D	*Terylene*	fats	hydrolysed

28 The diagram shows a plant cell as seen under a microscope.

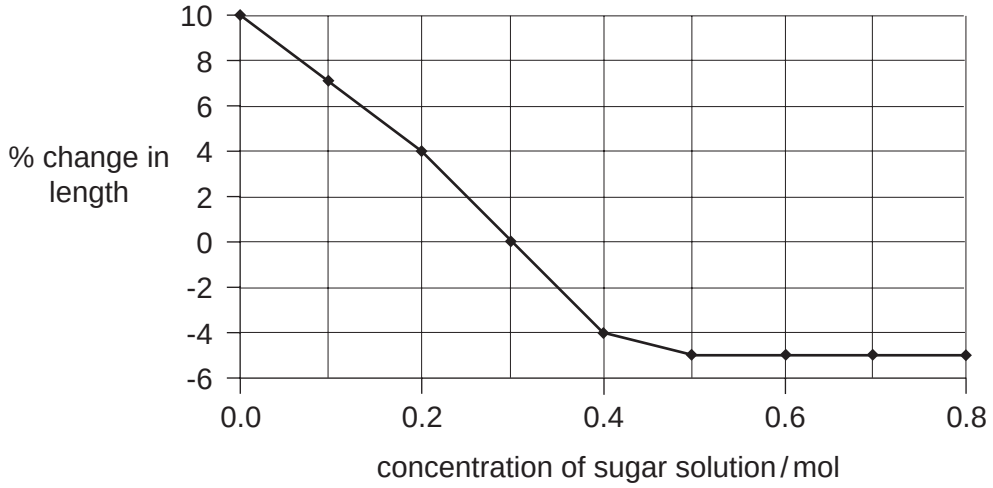


What are the functions in the cell of the numbered parts?

	controls the entry of substances	synthesis of carbohydrate
A	1	3
B	2	1
C	3	2
D	3	1

29 Cylinders of potato tissue were placed in different concentrations of a sugar solution.

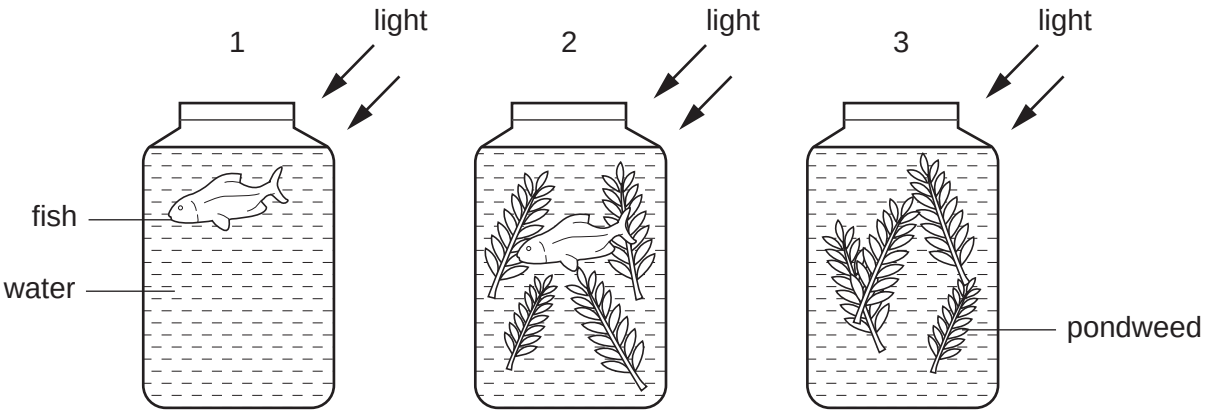
The graph shows the percentage change in length of the cylinders of potato tissue.



Which sugar solution has the same water potential as the potato tissue?

A 0.0 mol **B** 0.2 mol **C** 0.3 mol **D** 0.5 mol

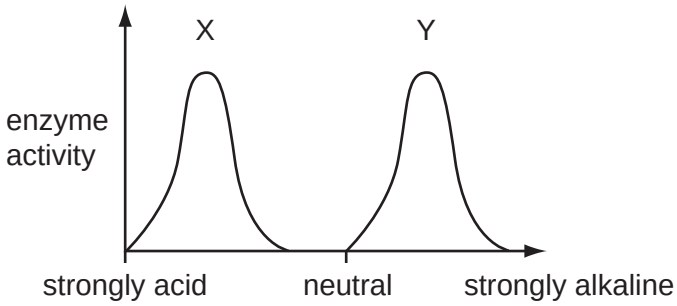
30 Three jars were set up as shown.



How will the concentration of dissolved carbon dioxide in the water of each jar change?

	jar 1	jar 2	jar 3
A	decreases	increases	no change
B	increases	increases	increases
C	increases	no change	decreases
D	no change	decreases	decreases

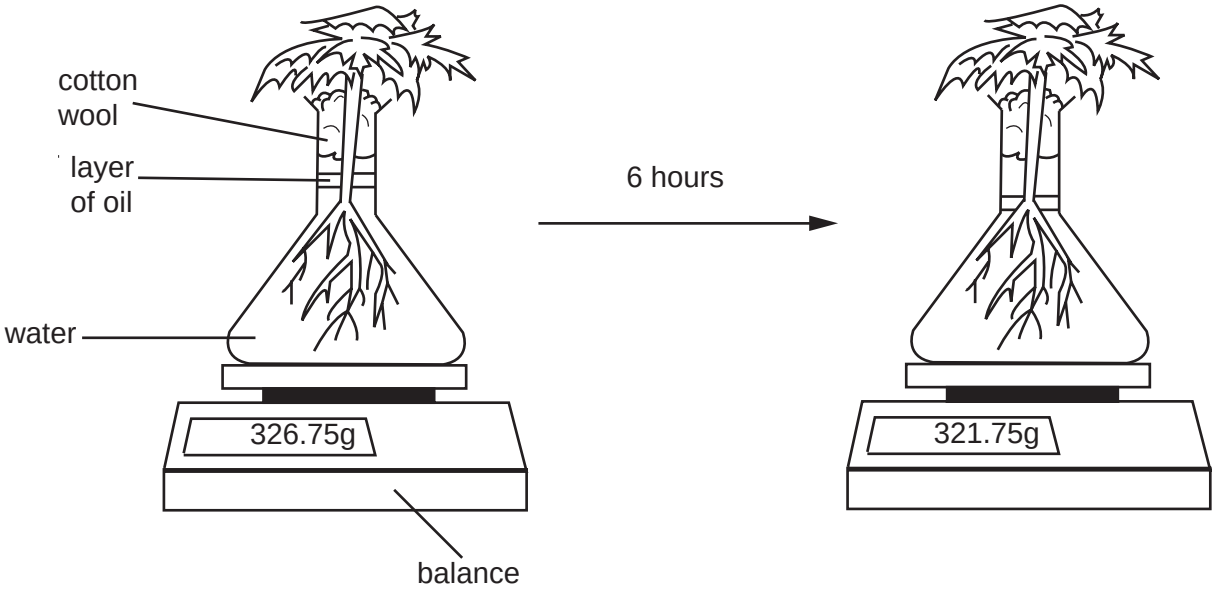
31 The diagram shows the effect of pH on the activity of two enzymes, X and Y, in the alimentary canal.



In which regions of the alimentary canal would these enzymes be most active?

	X	Y
A	duodenum	colon
B	duodenum	stomach
C	stomach	colon
D	stomach	duodenum

32 The diagrams show a plant in a flask of water. It is left for 6 hours on a warm, dry day in bright sunshine.



Which process explains the result after 6 hours?

A absorption of water into the root hairs

B evaporation of water from the flask

C photosynthesis in the leaves of the plant

D transpiration from the leaves of the plant

33 The amount of oxygen carried by human blood depends on the

A amount of plasma.

B number of platelets.

C number of red blood cells.

D number of white blood cells.

34 Which path does a molecule of oxygen take as it enters the body?

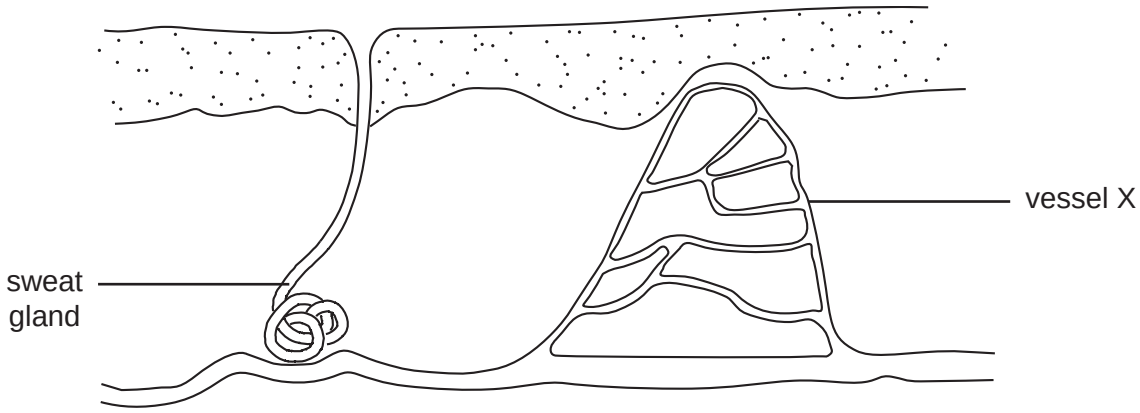
A alveolus → bronchiole → bronchus → trachea

B alveolus → bronchus → bronchiole → trachea

C trachea → bronchiole → bronchus → alveolus

D trachea → bronchus → bronchiole → alveolus

35 The diagram shows a section through skin.



What happens if the body temperature starts to fall below normal?

	sweat glands	blood flow in vessel X
A	secrete sweat	decreases
B	secrete sweat	increases
C	stop secreting sweat	decreases
D	stop secreting sweat	increases

36 Where is the hormone insulin produced and where does it act?

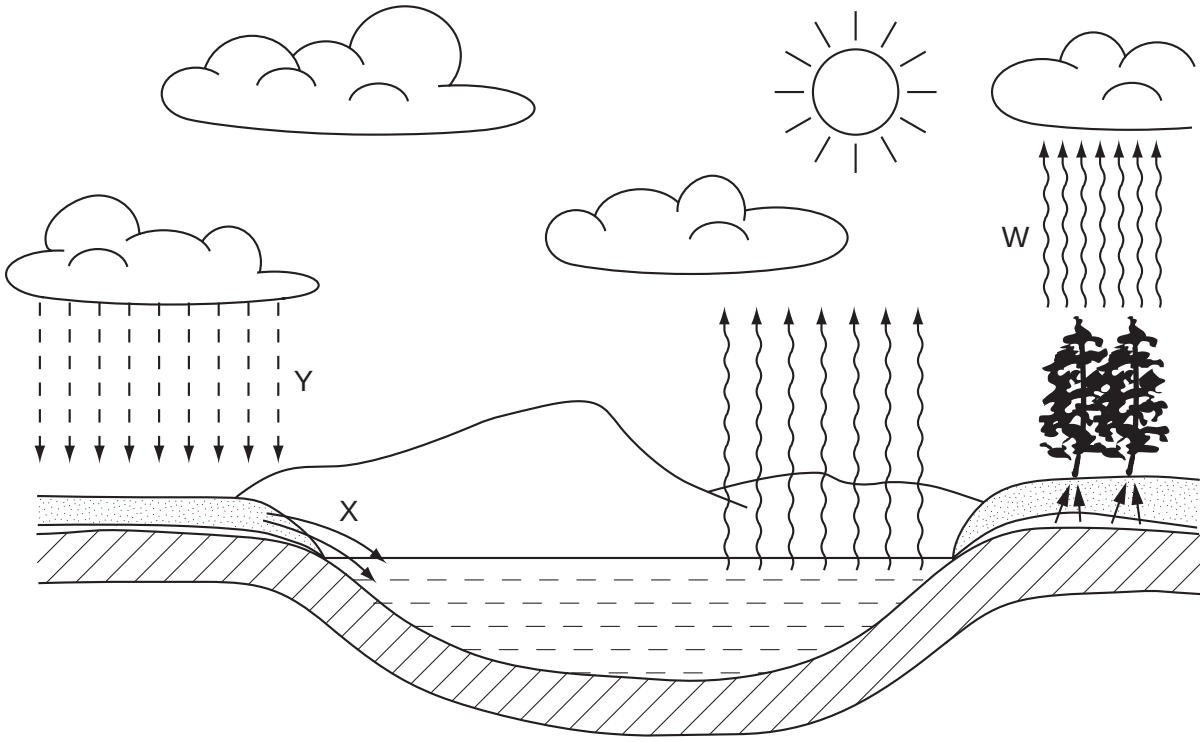
	site of production	site of action
A	adrenal glands	ileum
B	adrenal glands	liver
C	pancreas	ileum
D	pancreas	liver

37 The table shows the rate of energy flow through each of four trophic levels in an ecosystem.

Which trophic level contains the producers?

trophic level	energy flow / kJ per m^2 per year
A	3
B	32
C	301
D	3000

38 The diagram shows part of the water cycle.



What are processes W, X and Y?

	W	X	Y
A	evaporation	drainage	transpiration
B	evaporation	transpiration	rainfall
C	transpiration	drainage	rainfall
D	transpiration	rainfall	drainage

39 In plant reproduction, the following processes occur.

1 fertilisation
2 growth of a pollen tube
3 pollination
4 seed germination

In which order do these processes take place?

A 1 → 4 → 2 → 3

B 2 → 1 → 3 → 4

C 3 → 2 → 1 → 4

D 4 → 3 → 1 → 2

40 Which characteristic shows discontinuous variation in humans?

A blood group

B height

C intelligence

D weight

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DATA SHEET
The Periodic Table of the Elements

Group																		
I	II										III	IV	V	VI	VII	0
																4 He Helium 2
											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
7 Li Lithium 3	9 Be Beryllium 4										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
23 Na Sodium 11	24 Mg Magnesium 12										70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
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	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	127 I Iodine 53				
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 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	Po Polonium 84	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89													At Astatine 85	

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	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
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
90-103 Actinoid series

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

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