



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/11

Paper 1 Multiple Choice

May/June 2013

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

*
6
4
9
0
3
9
9
0
5
7
*

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.

DO NOT WRITE IN 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 Periodic Table is printed on page 20.

Electronic calculators may be used.

This document consists of **18** printed pages and **2** blank pages.



1 What is respiration?

- A the absorption of organic substances and mineral ions
- B the breakdown of molecules to release energy
- C the manufacture of carbohydrates from raw materials
- D the removal of excess substances, toxic materials and waste products

2 What are the functions of a red blood cell and a root hair cell?

	red blood cell	root hair cell
A	carries oxygen	absorbs inorganic ions
B	carries glucose	anchors the plant
C	forms part of a clot	absorbs carbon dioxide
D	prevents infection	absorbs water

3 Urea is made in the liver and is transported in the blood plasma for removal by the kidneys.

Which sequence of blood vessels is the shortest correct route for these urea molecules?

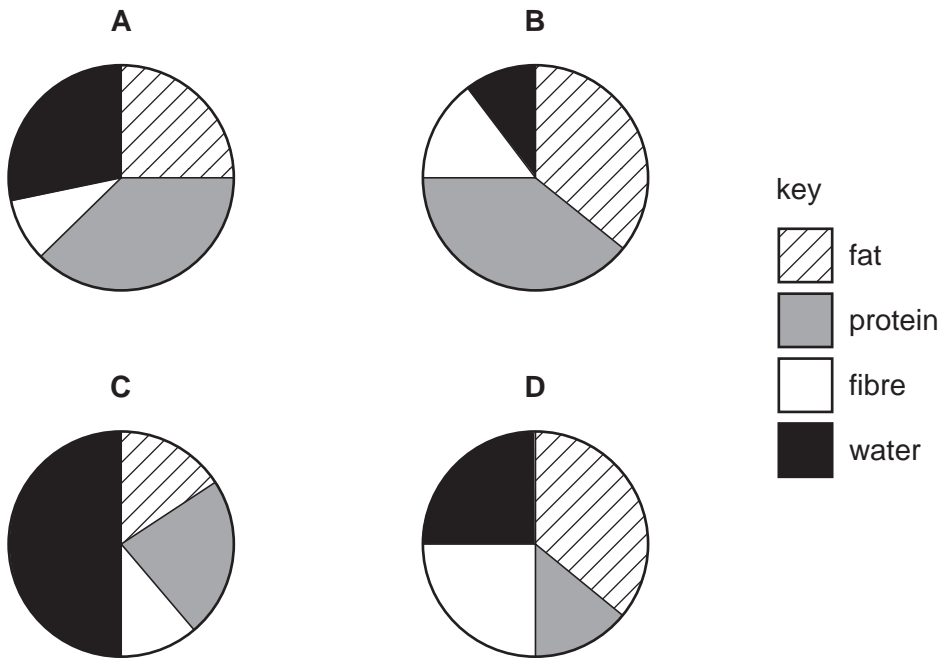
- A hepatic artery → pulmonary artery → aorta → renal artery
- B hepatic vein → pulmonary artery → pulmonary vein → renal artery
- C hepatic vein → pulmonary vein → pulmonary artery → renal artery
- D renal vein → vena cava → aorta → hepatic artery

4 Which statement about the alimentary canal is correct?

- A The large intestine includes the colon and rectum.
- B The large intestine includes the duodenum and rectum.
- C The small intestine includes the colon and ileum.
- D The small intestine includes the ileum and rectum.

5 The amounts of four dietary constituents are shown for four different foods.

Which food would provide most energy and help growth?



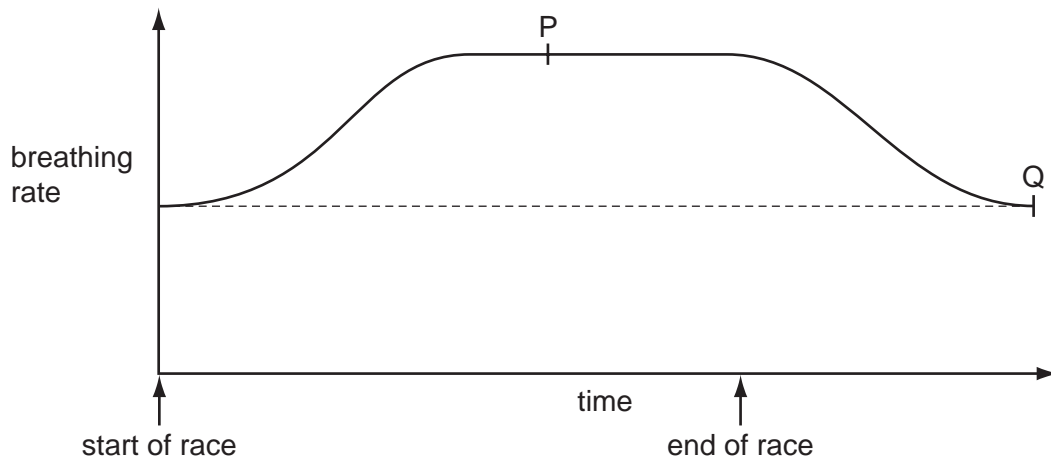
6 Tests were carried out on a clear liquid, with the following results.

test	colour obtained
Benedict's	blue
biuret	purple
iodine	blue/black

What did the clear liquid contain?

- A** protein only
 - B** protein and starch only
 - C** protein and reducing sugar only
 - D** protein, reducing sugar and starch
- 7 Which sequence shows the correct order of structures through which air passes when we breathe in?
- A** alveolus → bronchiole → trachea → bronchus
 - B** bronchus → trachea → alveolus → bronchiole
 - C** bronchiole → alveolus → bronchus → trachea
 - D** trachea → bronchus → bronchiole → alveolus

- 8 The graph shows changes in breathing rate as a boy runs a race.



What is happening at points P and Q?

	P	Q
A	breathing rate maximum	breathing at resting rate
B	breathing rate maximum	respiration stops
C	lungs fully inflated	breathing at resting rate
D	lungs fully inflated	respiration stops

- 9 What is homeostasis?
- A** the maintenance of the body's external environment
 - B** the maintenance of the body's internal environment
 - C** the processes that produce heat in the body
 - D** the removal of wastes from the body

10 The diagram shows a calendar for February and March with four days shaded.

	February				March			
	7	14	21	28	7	14	21	28
1	8	15	22	1	8	15	22	29
2	9	16	23	2	9	16	23	30
3	10	17	24	3	10	17	24	31
4	11	18	25	4	11	18	25	
5	12	19	26	5	12	19	26	
6	13	20	27	6	13	20	27	

Menstruation for a woman starts on February 14th.

During which day will the lining of the uterus be at its thickest and be richest in blood vessels?

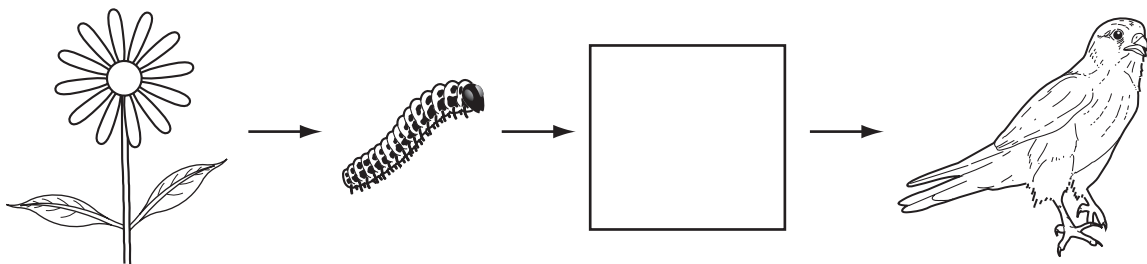
- A February 10th
- B February 15th
- C February 24th
- D March 15th

11 An organism has 28 chromosomes in each body cell.

How many chromosomes would there be in a gamete of the same organism?

- A 7
- B 14
- C 28
- D 56

12 The diagram shows a food chain.

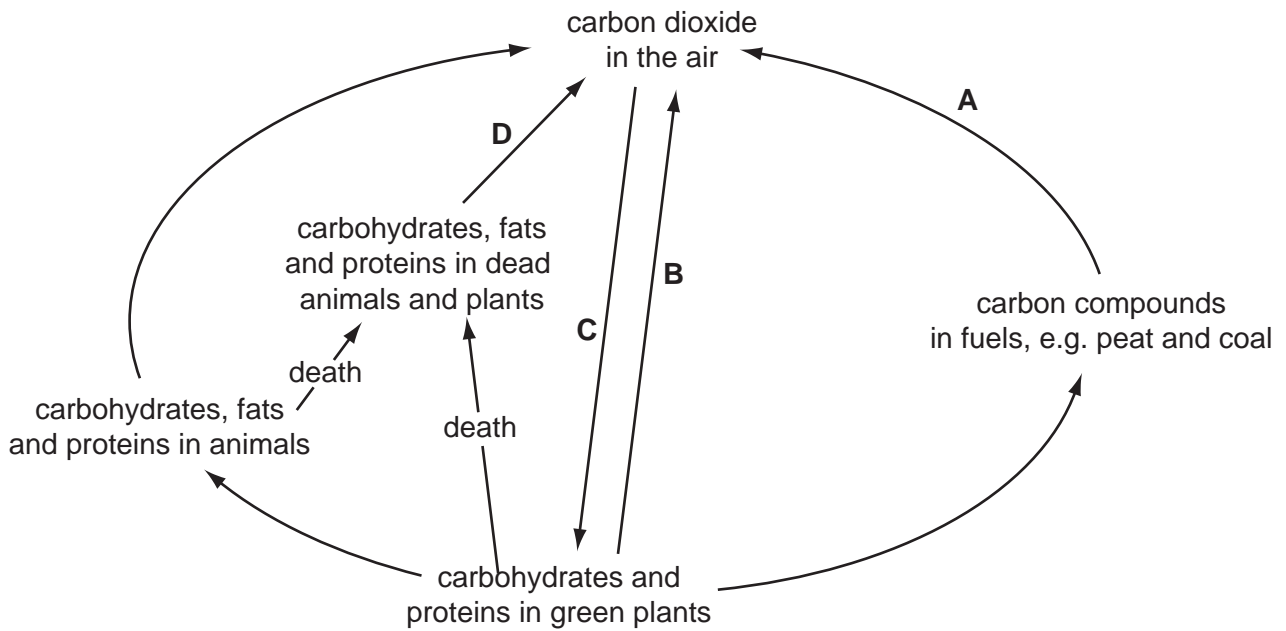


What does the empty box represent?

- A consumer
- B herbivore
- C photosynthesis
- D producer

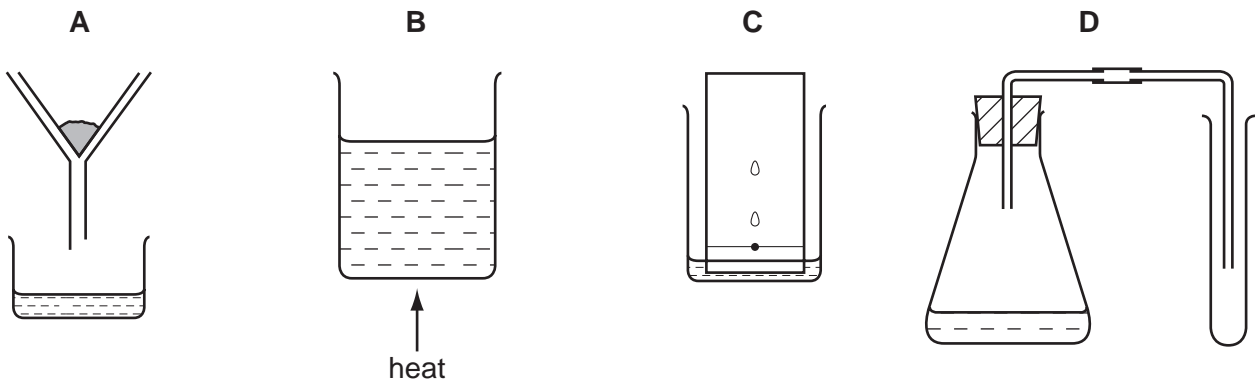
13 The diagram shows part of the carbon cycle.

During which stage is oxygen produced?



14 Henna is a dye extracted from a plant.

Which apparatus is used to show henna is a mixture of different colours?

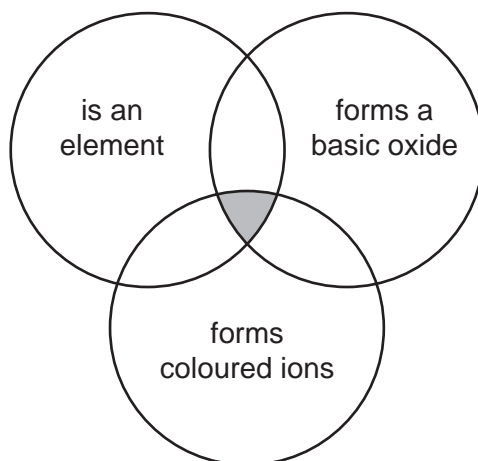


15 Atoms of element X have 11 nucleons and 6 neutrons.

What is element X?

- A boron
- B carbon
- C chlorine
- D sodium

16 The diagram shows overlapping circles into which different chemical formulae can be placed.



Which formula can be placed in the shaded area because it has all three properties?

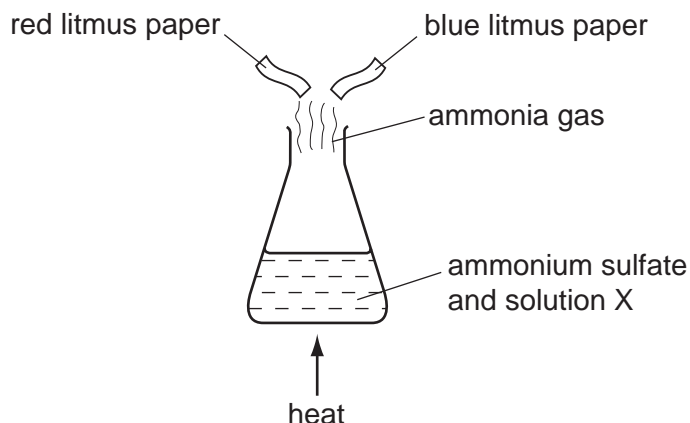
- A** Br₂ **B** CO **C** Cu **D** Na

17 Which substance is a non-metallic element?

	state at 25 °C	good electrical conductor	listed in the Periodic Table
A	gas	no	no
B	liquid	no	yes
C	liquid	yes	yes
D	solid	yes	no

18 When ammonium sulfate is heated with solution X, ammonia gas is given off.

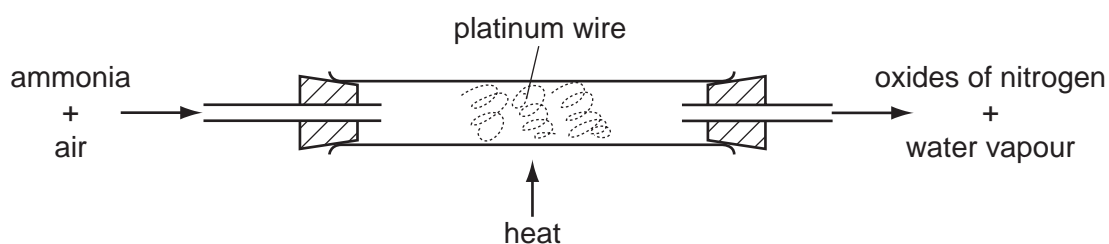
A piece of moist red litmus paper and a piece of moist blue litmus paper are held in the gas.



What is solution X and how does the colour of the litmus paper change?

	solution X	colour change of litmus paper
A	hydrochloric acid	blue to red
B	hydrochloric acid	red to blue
C	sodium hydroxide	blue to red
D	sodium hydroxide	red to blue

19 Ammonia is oxidised as shown.



The platinum is chemically unchanged at the end of the reaction.

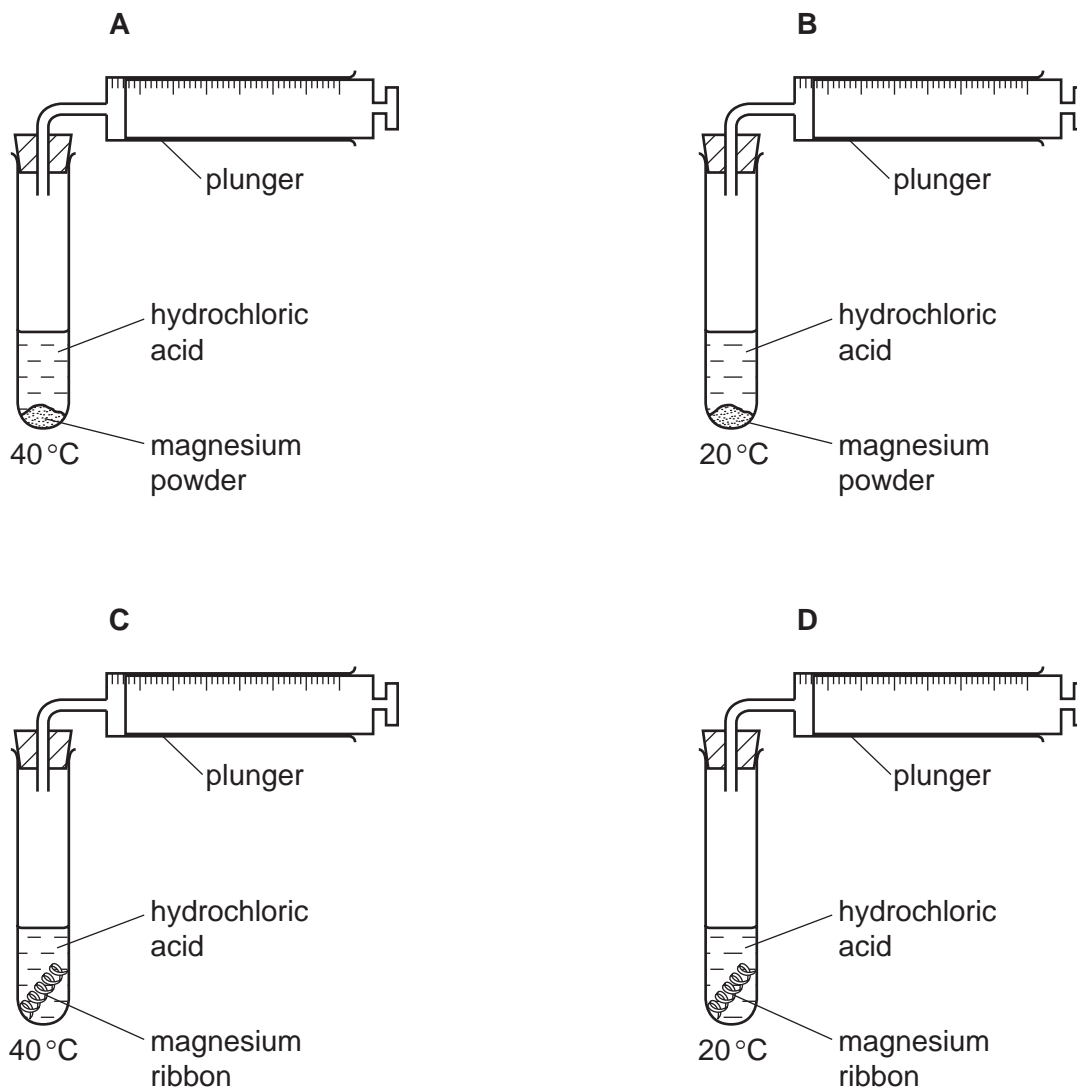
What is the reason for using platinum?

- A** to absorb the heat from the reaction
- B** to filter out oxygen from the air
- C** to increase the rate of the reaction
- D** to neutralise the ammonia

20 Equal masses of magnesium are reacted with 10cm^3 of hydrochloric acid of the same concentration.

Hydrogen is produced.

Under which conditions does the hydrogen push the plunger of the syringe out most quickly?



21 Which household substances are acidic?

	table salt solution	lemon juice	sugar solution	vinegar
A	✓	✓	x	x
B	✓	x	✓	x
C	x	✓	x	✓
D	x	x	✓	✓

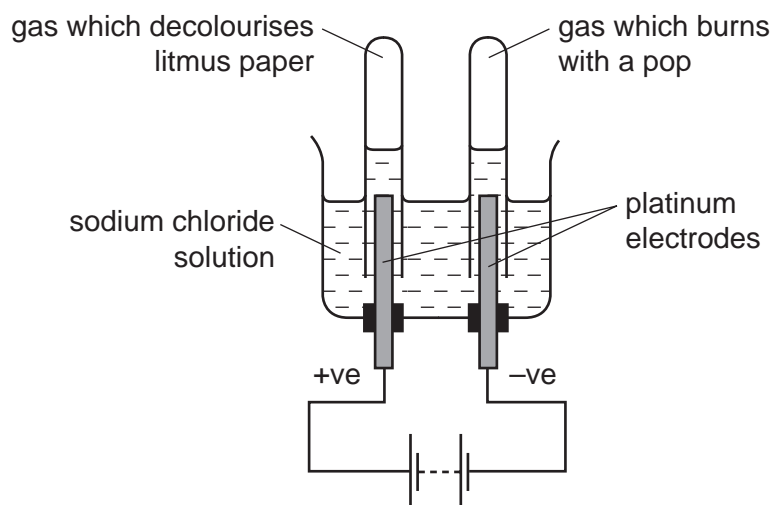
key

✓ = yes

x = no

22 Sodium chloride solution is electrolysed and a gas is collected at each electrode.

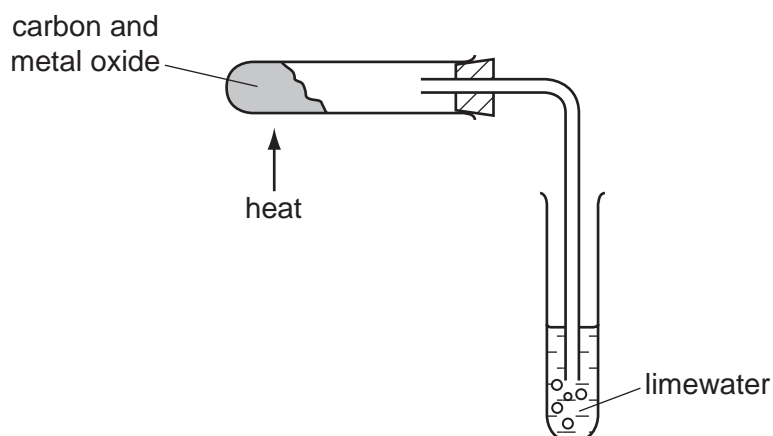
One gas decolourises moist litmus paper, the other gas burns with a pop.



Which statement is correct?

- A Chlorine gas is collected at the anode.
- B Hydrogen gas is collected at the anode.
- C Oxygen gas is collected at the cathode.
- D Sodium is formed at the cathode.

23 A metal oxide is mixed with carbon and heated as shown.



The limewater turns cloudy.

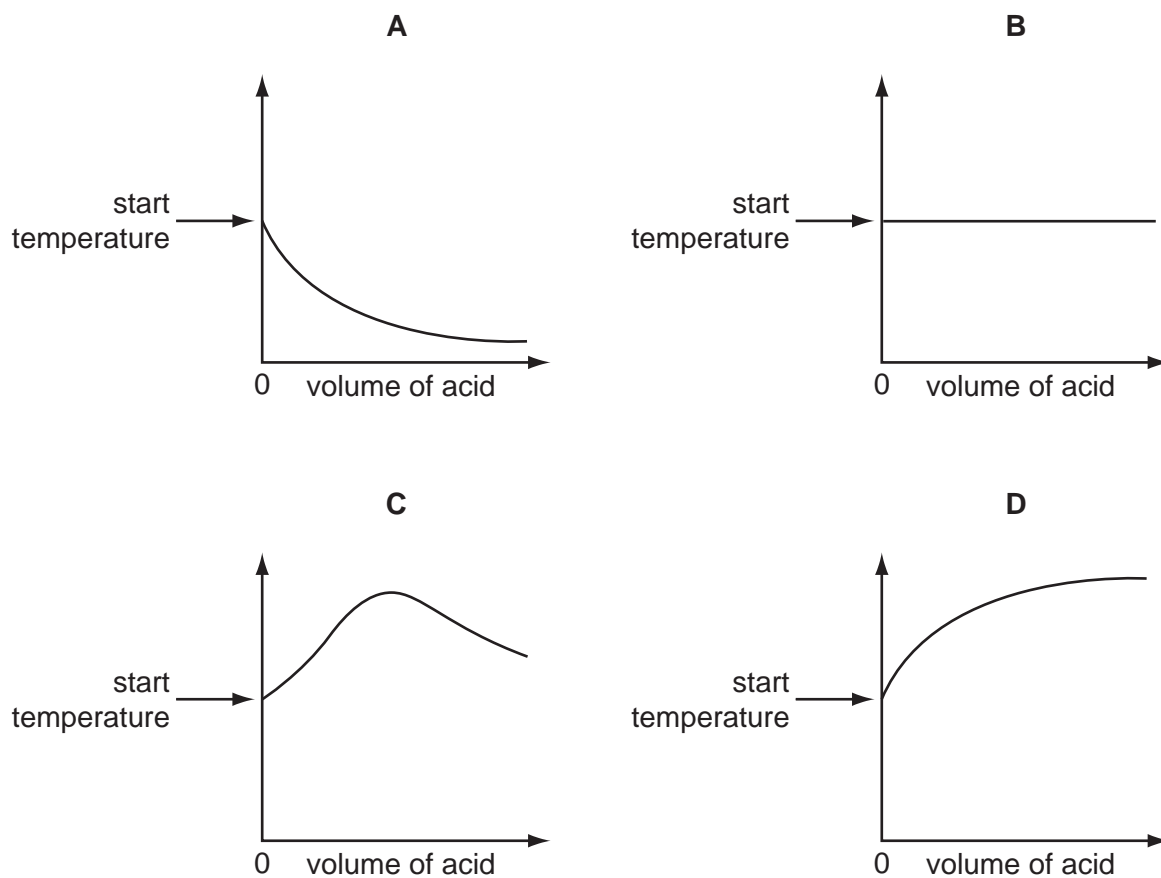
Which term describes what happens to the metal oxide?

- A combustion
 - B neutralisation
 - C oxidation
 - D reduction
- 24 An old iron sword that had been buried under the ground was found covered with a layer of tar.
- When the tar was removed no rust could be observed on the sword.
- What is the reason for this?
- A The tar allowed oxygen and water to come into contact with the iron sword.
 - B The tar allowed oxygen but not water to come into contact with the iron sword.
 - C The tar prevented oxygen and water from coming into contact with the iron sword.
 - D The tar prevented oxygen but not water from coming into contact with the iron sword.
- 25 Why do farmers add lime to soil?
- A It acts as a fertiliser.
 - B It adds nitrogen to the soil.
 - C It decreases the pH of the soil.
 - D It increases the pH of the soil.

26 An acid is added to an alkali until the final solution is **just** neutral.

The reaction is exothermic.

Which graph shows how the temperature changes as the acid is added to the alkali?



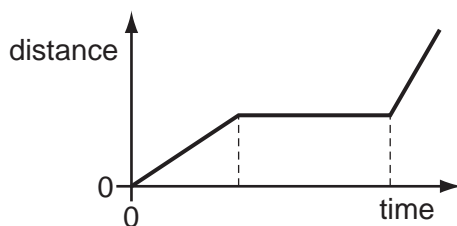
27 The diagram represents the arrangement of atoms in a molecule of a compound.



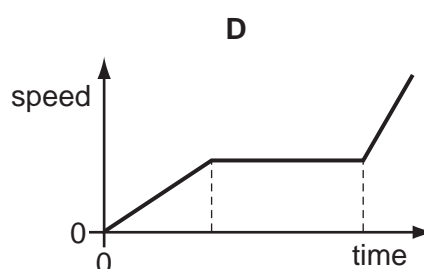
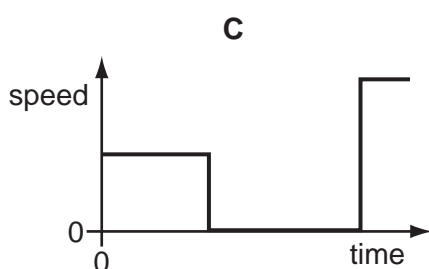
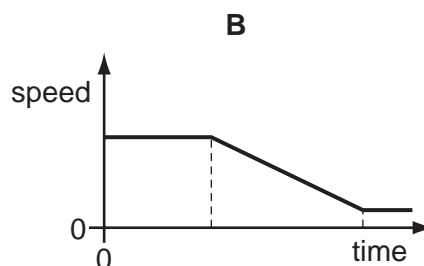
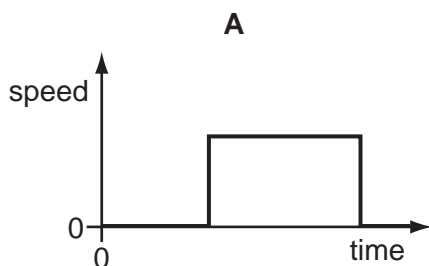
What is the molecular formula of the compound?

- A** CH₂ **B** C₃H₆ **C** C₃H₈ **D** C₆H₃

28 The diagram shows a distance/time graph for a journey.



Which is the speed/time graph for this journey?



29 Which property of an object **cannot** be affected by applying a force?

- A direction of movement
- B mass
- C shape
- D speed

30 From which type of energy is electrical energy obtained in a hydroelectric power station?

- A chemical energy
- B gravitational energy
- C nuclear energy
- D strain energy

- 31 A beaker of cool liquid stands in a warm room. The temperature of the liquid is falling because molecules are escaping from the surface of the liquid.

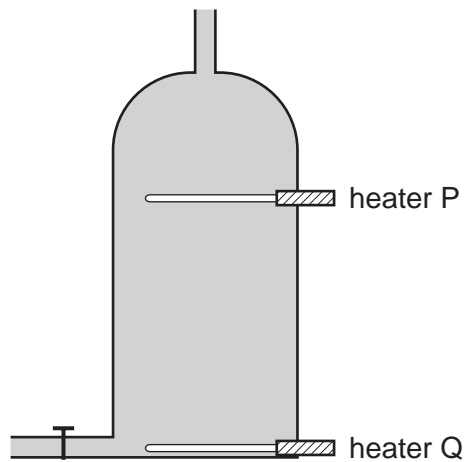
Which row gives the name of this process, and also shows which molecules are escaping from the liquid?

	name of process	molecules that are escaping
A	condensation	least energetic
B	condensation	most energetic
C	evaporation	least energetic
D	evaporation	most energetic

- 32 Which row shows what happens to the temperature of a solid as it melts and what happens to the temperature of a liquid as it boils?

	temperature when a solid melts	temperature when a liquid boils
A	increases	increases
B	increases	no change
C	no change	increases
D	no change	no change

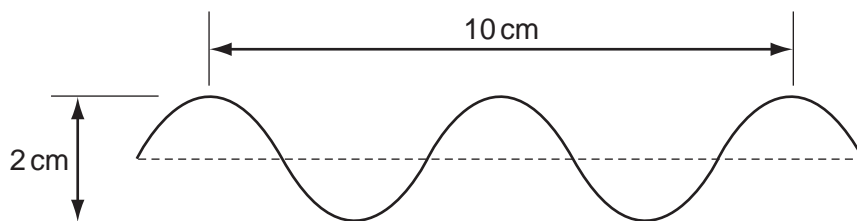
- 33 A hot water tank is fitted with two identical heaters P and Q. Heater P is two thirds of the way up the tank and heater Q is at the very bottom. The tank is full of cold water.



When only heater Q is switched on, it takes a long time to heat the tank of water to the required temperature of 60°C .

What happens to the tank of cold water if only heater P is switched on?

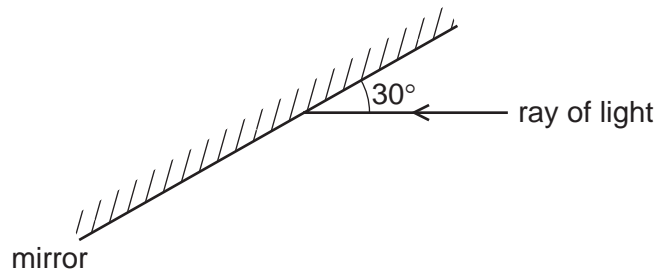
- A All the water reaches 60°C in less time than before.
 - B All the water reaches 60°C in the same time as before.
 - C The bottom two thirds of the water reaches 60°C in two thirds of the original time.
 - D The top one third of the water reaches 60°C in one third of the original time.
- 34 The diagram shows a wave.



What is the amplitude of the wave?

- A 1 cm
- B 2 cm
- C 5 cm
- D 10 cm

35 A ray of light strikes a plane mirror.



What is the angle of reflection of the ray?

- A** 150° **B** 90° **C** 60° **D** 30°

36 An electronic engineer wishes to make a remote controller to operate a television.

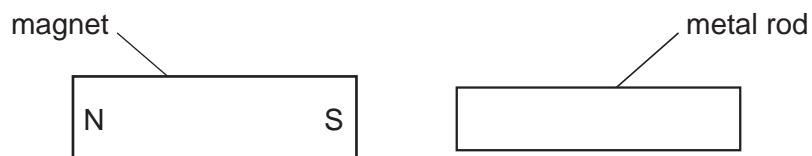
Which type of electromagnetic radiation must the remote controller emit?

- A** infra-red waves
B microwaves
C radio waves
D ultraviolet waves

37 Which change to a sound wave would make it louder?

- A** decreasing the amplitude
B increasing the amplitude
C decreasing the wavelength
D increasing the wavelength

- 38 A bar magnet is brought near a metal rod.

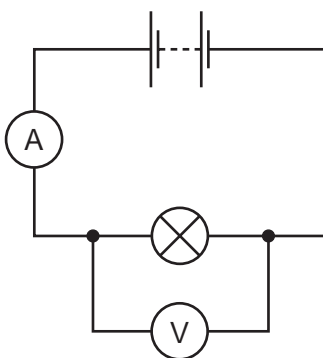


The magnet is then turned around so that its poles have changed positions. The magnet is again brought near to the metal rod.

In both cases the metal rod is attracted to the magnet.

What could the metal rod be?

- A another bar magnet
 - B a piece of aluminium
 - C a piece of copper
 - D a piece of iron
- 39 The circuit shown is used to determine the resistance of a lamp.



The ammeter reading is 2.0 A and the voltmeter reading is 6.0 V.

What is the resistance of the lamp?

- A 0.33 Ω
 - B 3.0 Ω
 - C 8.0 Ω
 - D 12 Ω
- 40 Which row compares the number of protons and the number of neutrons in atoms of different isotopes of an element?

	number of protons	number of neutrons
A	different	different
B	different	the same
C	the same	different
D	the same	the same

DATA SHEET
The Periodic Table of the Elements

		Group																
	I	II	III	IV	V	VI	VII	0										
	1 H Hydrogen 1																	
	9 Be Beryllium 4																	
7 Li Lithium 3								4 He Helium 2										
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	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	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	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			
226 Ra Radium 88	227 Ac Actinium 89	†																
†	†	†																
		140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	144 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	238 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	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			

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

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

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

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