



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/11**

Paper 1 Multiple Choice

**October/November 2012**

**45 minutes**

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 16.

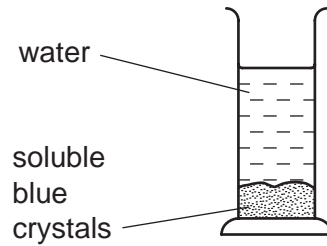
This document consists of **16** printed pages.



1 Which part of a cell has the greatest mass?

- A cytoplasm
- B membrane
- C nucleus
- D vacuole

2 Apparatus is set up as shown.



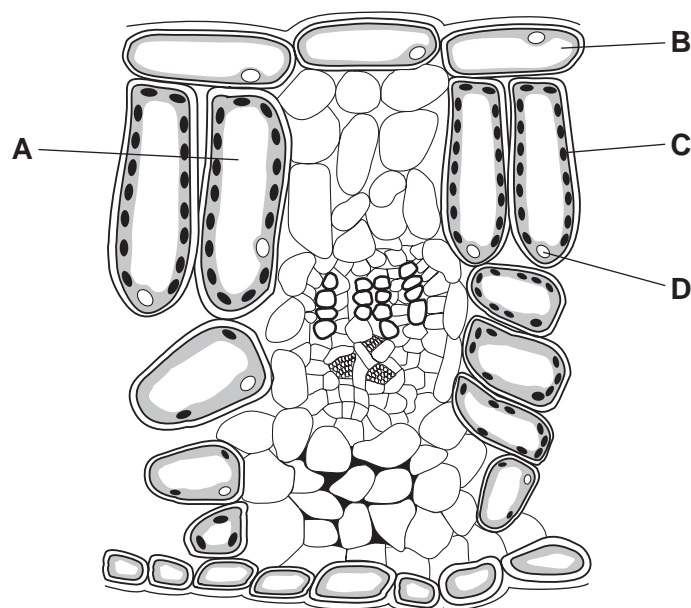
After several hours, all the water has turned blue.

Which process causes this colour change to take place?

- A assimilation
- B diffusion
- C digestion
- D evaporation

3 The diagram shows a section through a green leaf.

Where are carbohydrates made?



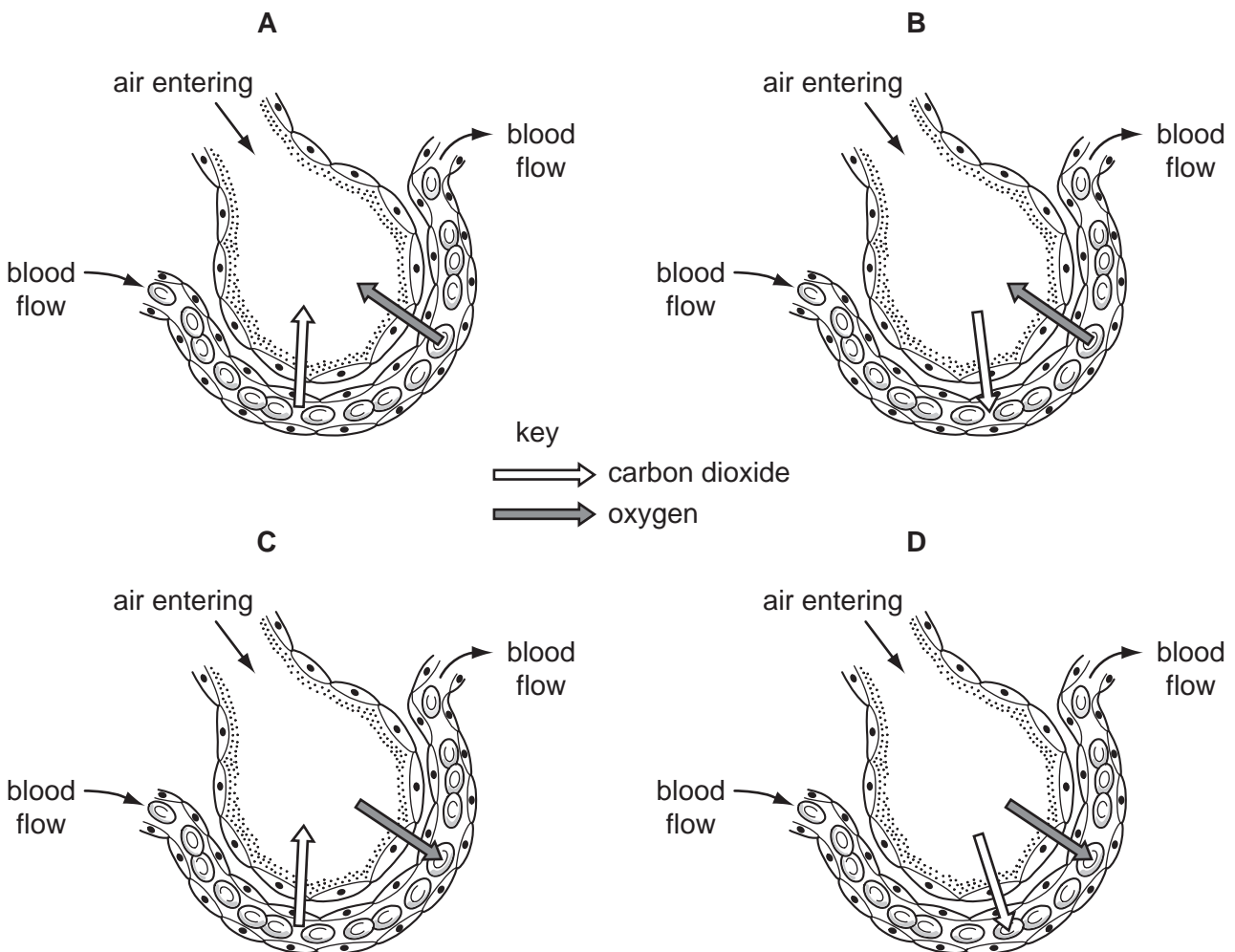
4 How should the diet of a weight-lifter differ from the diet of an office worker?

- A She should eat less fat.
- B She should eat more protein.
- C She should eat less carbohydrate.
- D She should eat more fibre.

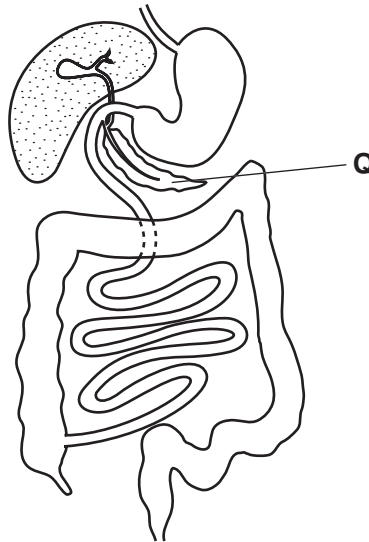
5 Which vessels carry blood towards the heart?

	aorta	pulmonary artery	pulmonary vein	vena cava
A	✓	✓	x	x
B	✓	x	✓	x
C	x	✓	x	✓
D	x	x	✓	✓

6 Which diagram shows the diffusion of carbon dioxide and oxygen between an alveolus and a capillary?



- 7 Which process would **not** work well in an adult person whose diet consists solely of milk?
- A** absorption of digested food into the blood
- B** digestion of fats in the milk
- C** maintenance of strong bones
- D** movement of food along the intestines
- 8 The diagram shows the human alimentary canal.



Proteases are produced by structure **Q**.

What is structure **Q** and which nutrient does protease digest?

	structure <b>Q</b>	nutrient digested
<b>A</b>	liver	fat
<b>B</b>	liver	protein
<b>C</b>	pancreas	fat
<b>D</b>	pancreas	protein

- 9 Which is an example of homeostasis?
- A** adding acid to food in the stomach
- B** breathing out water vapour from the lungs
- C** keeping the body temperature steady
- D** producing adrenaline in the adrenal glands

10 Which process is taking place as pollen lands on the stigma of a flower?

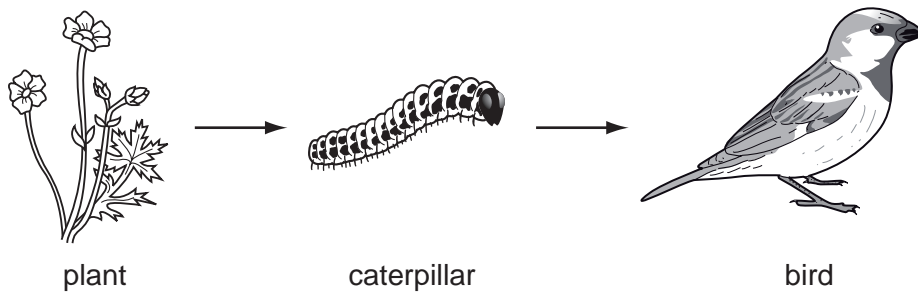
- A asexual reproduction
- B fertilisation
- C germination
- D pollination

11 Allele T is dominant over allele t.

Which cross will produce offspring with phenotypes in a 1:1 ratio?

- A  $tt \times tt$
- B  $Tt \times Tt$
- C  $Tt \times tt$
- D  $TT \times tt$

12 The diagram shows a food chain.



Which row is correct?

	plant	caterpillar	bird
A	makes energy	eats leaves	uses energy
B	makes starch	is a producer	is a consumer
C	photosynthesises	digests food	eats animals
D	traps light	feeds on plants	is a decomposer

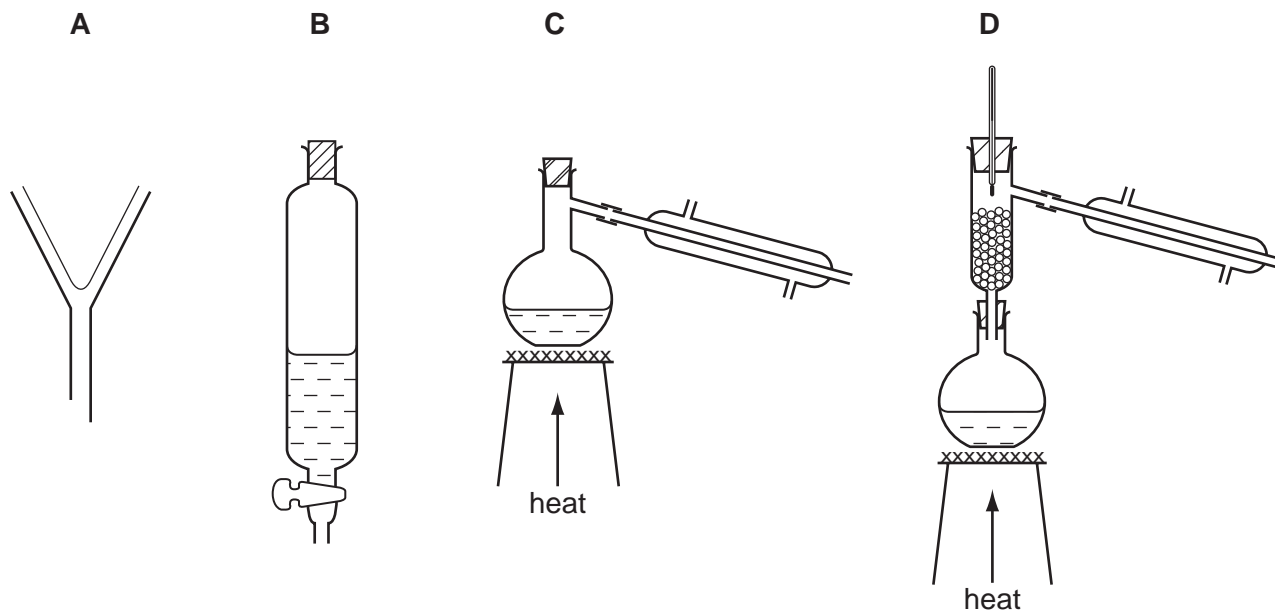
13 In the carbon cycle, several different processes may release carbon dioxide from dead organisms.

Which process does **not** do so?

- A combustion
- B decomposition
- C photosynthesis
- D respiration

14 Hexane and octane are liquid hydrocarbons that mix together.

Which is the best method of separating a mixture of these two liquids?

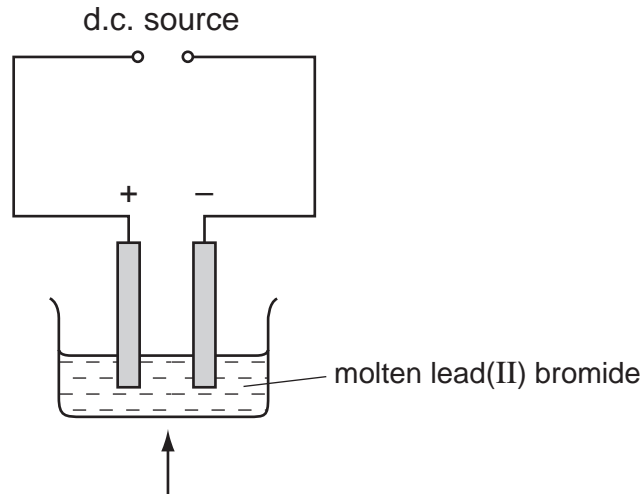


15 What are the charge and mass of an electron?

	charge	mass
<b>A</b>	+1	negligible
<b>B</b>	+1	1
<b>C</b>	-1	negligible
<b>D</b>	-1	1

16 Molten lead(II) bromide is electrolysed as shown.

An element is produced at the negative electrode.



What is the name of the element and of the electrode?

	element	electrode
<b>A</b>	bromine	anode
<b>B</b>	bromine	cathode
<b>C</b>	lead	anode
<b>D</b>	lead	cathode

17 Burning coal has advantages and disadvantages.

Which row is correct?

	the reaction is exothermic	the reaction can cause 'acid rain'
<b>A</b>	advantage	advantage
<b>B</b>	advantage	disadvantage
<b>C</b>	disadvantage	advantage
<b>D</b>	disadvantage	disadvantage

18 Hydrochloric acid reacts with calcium carbonate.

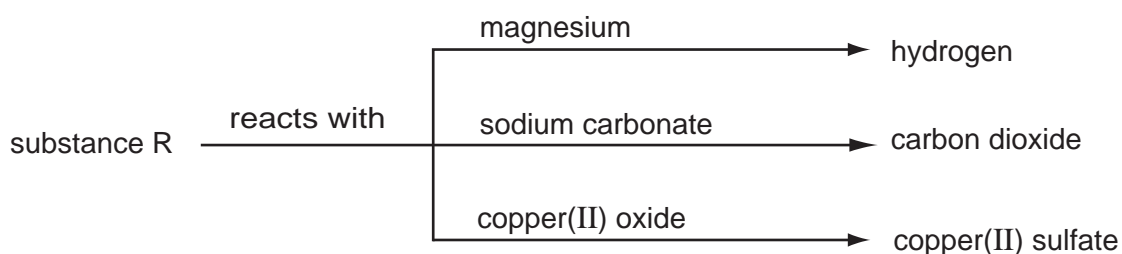
The equation for the reaction is shown.



Which change increases the speed of the reaction?

- A Decrease the temperature of the hydrochloric acid.
- B Increase the concentration of the hydrochloric acid.
- C Increase the size of the calcium carbonate particles.
- D Increase the volume of the hydrochloric acid.

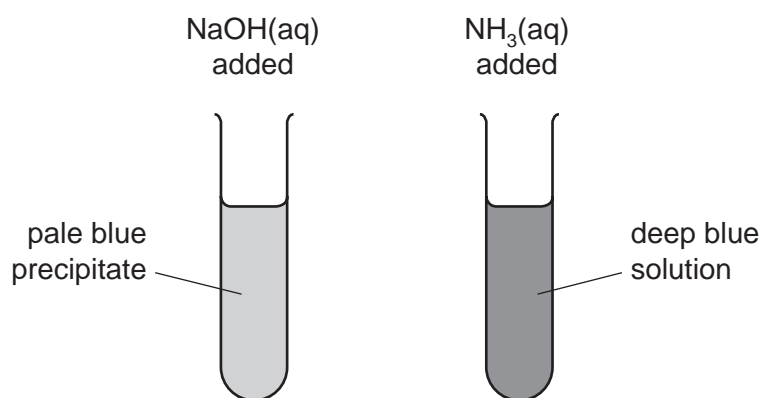
19 Some reactions of a substance, R, are shown in the diagram.



What type of substance is R?

- A an acid
- B a base
- C an element
- D a salt

20 The diagrams show the results of adding an excess of aqueous sodium hydroxide and aqueous ammonia to separate solutions of salt S.



Which metal ion is present in salt S?

- A  $\text{Cu}^{2+}$
- B  $\text{Fe}^{2+}$
- C  $\text{Fe}^{3+}$
- D  $\text{Zn}^{2+}$



21 An element X has a high melting point and its oxide is coloured.

Which row is correct?

	element	oxide
<b>A</b>	transition metal	acidic
<b>B</b>	transition metal	basic
<b>C</b>	non-metal	acidic
<b>D</b>	non-metal	basic

22 The atoms of two elements can be represented by  ${}^4_2\text{X}$  and  ${}^{20}_{10}\text{Y}$ .

Which properties do both elements have?

	they are gaseous	they are unreactive
<b>A</b>	✓	✓
<b>B</b>	✓	x
<b>C</b>	x	✓
<b>D</b>	x	x

23 Alloys are metals formed by dissolving one metal in another.

Alloys are .....X..... .

.....Y..... alloys conduct electricity.

Which words correctly complete the statements?

	X	Y
<b>A</b>	compounds	All
<b>B</b>	compounds	Some
<b>C</b>	mixtures	All
<b>D</b>	mixtures	Some

24 The table gives some information about the reactivity of three different metals.

metal	reaction with water or steam	reaction with dilute hydrochloric acid
X	reacts with cold water	reacts with cold acid
Y	no reaction when heated in steam	no reaction when boiled with acid
Z	reacts when heated in steam	reacts when warmed with acid

What is the order of reactivity of the three metals?

	most reactive	—————>	least reactive
<b>A</b>	X	Y	Z
<b>B</b>	X	Z	Y
<b>C</b>	Y	Z	X
<b>D</b>	Z	X	Y

25 Which three elements do most fertilisers contain?

- A** Na, C, P      **B** Na, P, K      **C** K, C, N      **D** K, P, N

26 Which process produces molecules with long chains?

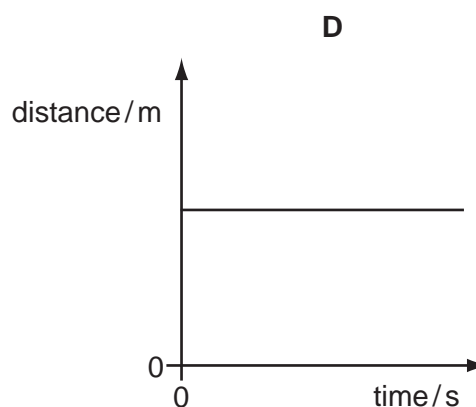
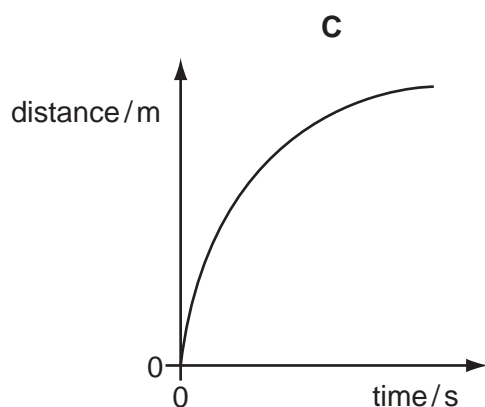
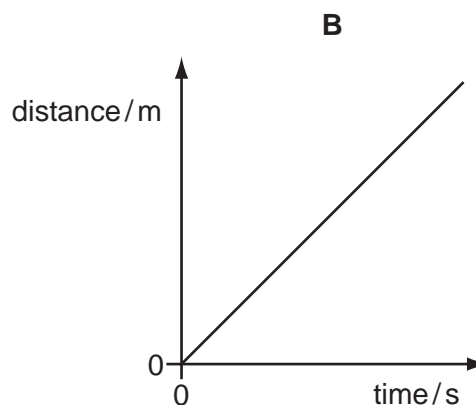
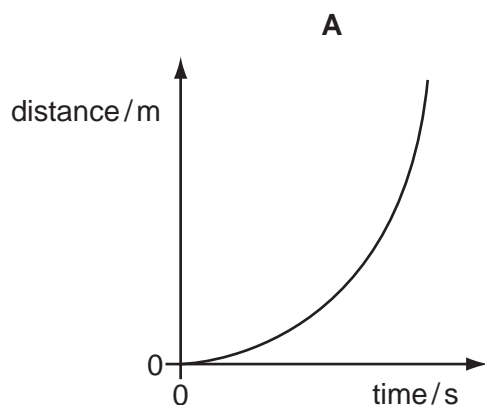
- A** combustion of hydrocarbons  
**B** cracking  
**C** fractional distillation of petroleum  
**D** polymerisation

27 Which of the following is **not** produced by fractional distillation of petroleum?

- A** diesel fuel  
**B** ethanol  
**C** paraffin  
**D** petrol

28 The following are distance / time graphs.

Which graph shows an object travelling at constant speed?



29 What is the density of an object that has a mass of 20 g and a volume of 5 cm<sup>3</sup>?

- A** 4 g/cm<sup>3</sup>      **B** 15 g/cm<sup>3</sup>      **C** 25 g/cm<sup>3</sup>      **D** 100 g/cm<sup>3</sup>

30 Which is a non-renewable energy resource?

- A** coal  
**B** geothermal  
**C** solar  
**D** wave

31 Which statement about a gas in a container of constant volume is correct?

- A** The less often the gas molecules collide with the container walls, the higher the pressure.  
**B** The lower the temperature of a gas, the more often its molecules collide with the container walls.  
**C** The pressure of a gas increases as its temperature decreases.  
**D** The temperature of a gas increases as the speed of the gas molecules increases.

32 Which statement about the transfer of thermal energy is correct?

- A Heat transfer by radiation involves mainly ultraviolet radiation.
- B Heat transfer by radiation requires a medium to travel through.
- C The main method of heat transfer through gases is conduction.
- D The main method of heat transfer through liquids is convection.

33 Diagram 1 represents a wave.

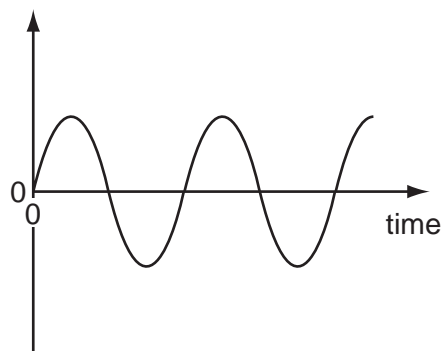
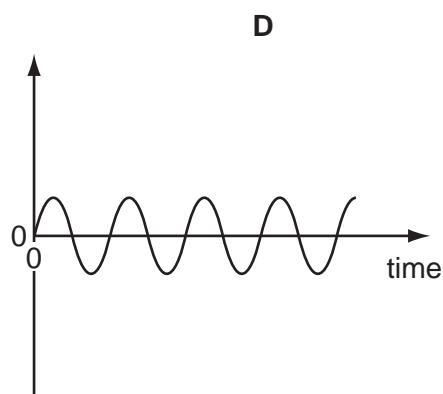
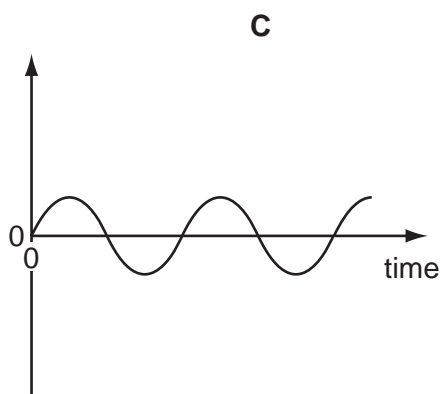
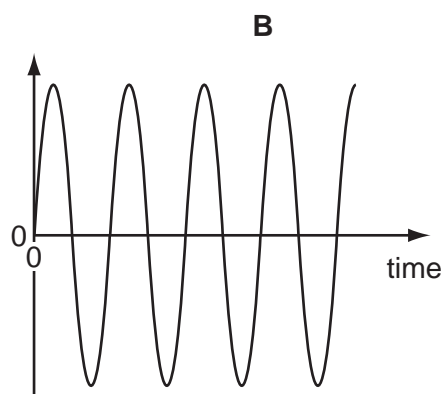
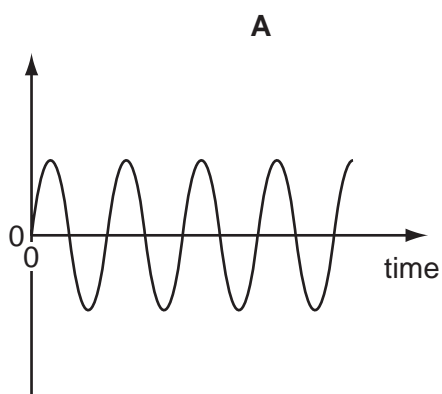


diagram 1

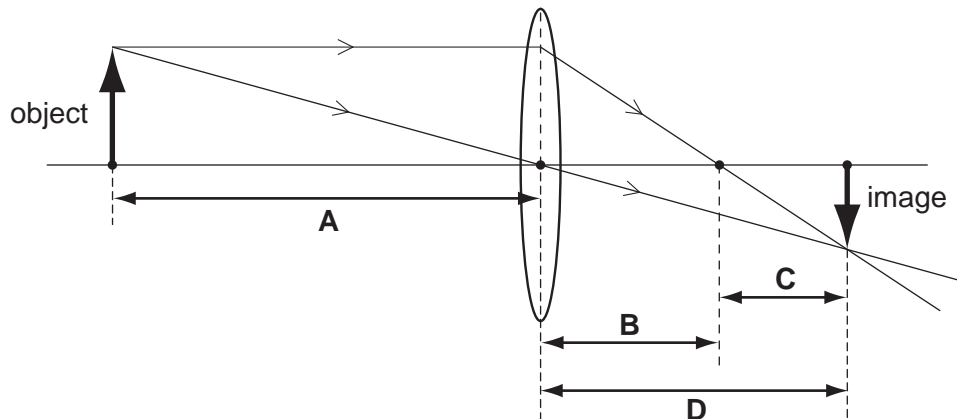
Which diagram represents a wave with double the frequency and half the amplitude of the wave in diagram 1?

The scales are the same in all the diagrams.



34 The diagram shows how a real image is formed by a converging lens.

Which distance is the focal length of the lens?

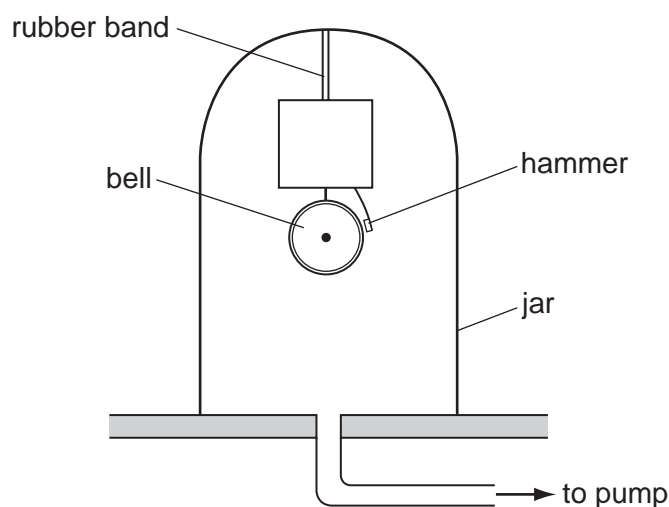


35 Radio waves, infra-red radiation and visible light are different types of electromagnetic waves.

What is true for these electromagnetic waves?

- A Infra-red radiation travels more quickly than visible light.
- B Radio waves travel more quickly than infra-red radiation.
- C Radio waves travel at the same speed as visible light.
- D Visible light travels more slowly than radio waves.

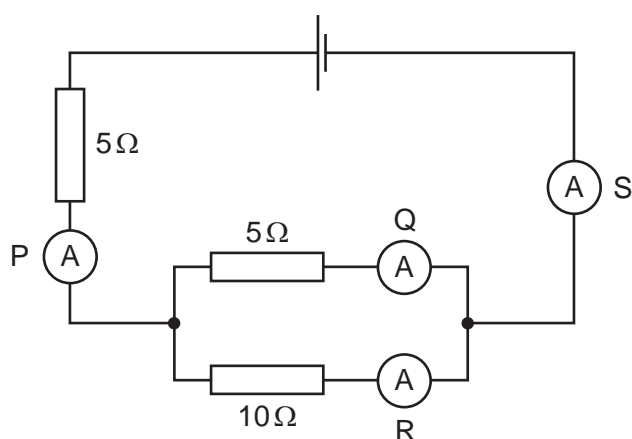
- 36 An electric bell with its own battery is suspended by a rubber band inside a sealed glass jar. The hammer hits the bell and makes it ring. A pump can remove air from the jar.



The pump is switched on and the air is removed from the jar. The hammer still hits the bell but the sound becomes quieter until it cannot be heard.

Why does this happen?

- A An electric current cannot flow in a vacuum.
  - B A medium is required to transmit sound waves.
  - C The bell cannot be made to vibrate in a vacuum.
  - D The pitch of the note is now outside the range of human hearing.
- 37 The circuit contains four ammeters, P, Q, R and S.



Which statement about the readings on the ammeters is correct?

- A The reading on S is less than the reading on P.
- B The reading on Q is greater than the reading on S.
- C The reading on R is less than the reading on S.
- D The reading on Q is greater than the reading on P.

38 A student wishes to measure an e.m.f. and a potential difference.

Which meter(s) does she need?

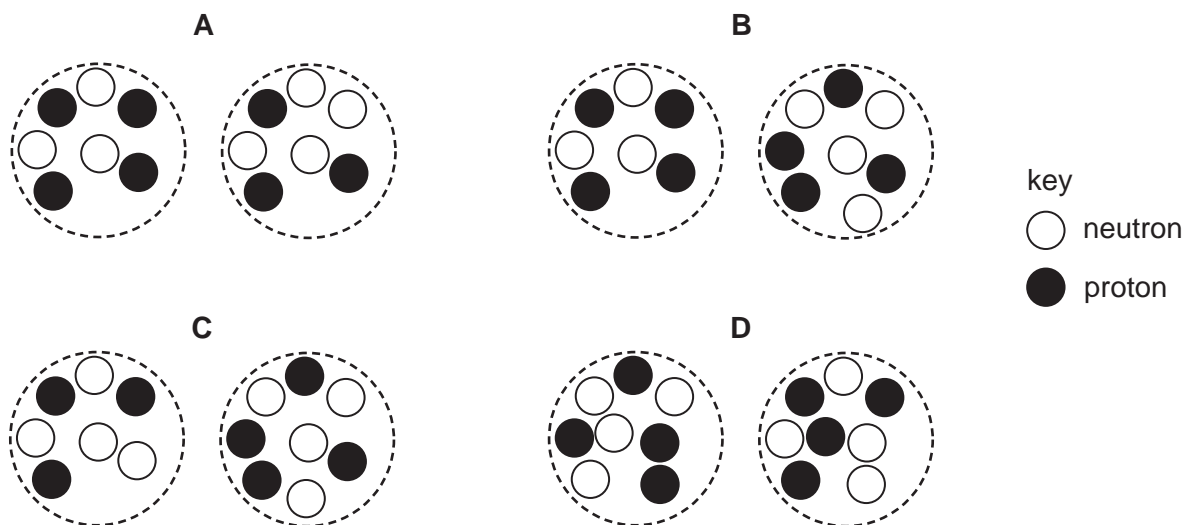
- A an ammeter only
- B a voltmeter only
- C a voltmeter and an ammeter
- D a voltmeter and a newton meter

39 Which type of radiation has the greatest ionising effect?

- A  $\alpha$ -particles
- B  $\beta$ -particles
- C  $\gamma$ -rays
- D infra red rays

40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?



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

		Group																				
I	II	III	IV	V	VI	VII	0															
		1 <b>H</b> Hydrogen 1						4 <b>He</b> Helium 2														
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4							20 <b>Ne</b> Neon 10														
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	5 <b>B</b> Boron 5	6 <b>C</b> Carbon 6	7 <b>N</b> Nitrogen 7	8 <b>O</b> Oxygen 8	9 <b>F</b> Fluorine 9		14 <b>N</b> Nitrogen 7	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	17 <b>Cl</b> Chlorine 17	18 <b>Ar</b> Argon 18										
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	11 <b>B</b> Boron 5	12 <b>C</b> Carbon 6	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulfur 16	70 <b>Ga</b> Gallium 31	71 <b>Ge</b> Germanium 32	72 <b>As</b> Arsenic 33	73 <b>Se</b> Selenium 34	74 <b>Br</b> Bromine 35	75 <b>Kr</b> Krypton 36									
85 <b>Rb</b> Rubidium 37	86 <b>Sr</b> Strontium 38	56 <b>Fe</b> Iron 26	57 <b>Mn</b> Manganese 25	58 <b>Cr</b> Chromium 24	59 <b>V</b> Vanadium 23	60 <b>Ti</b> Titanium 22	61 <b>Sc</b> Scandium 21	62 <b>Zn</b> Zinc 30	63 <b>Cu</b> Copper 29	64 <b>Ni</b> Nickel 28	65 <b>Co</b> Cobalt 27	66 <b>Rh</b> Rhodium 45	67 <b>Pd</b> Palladium 46	68 <b>Ag</b> Silver 47	69 <b>Cd</b> Cadmium 48	70 <b>In</b> Indium 49	71 <b>Sn</b> Tin 50	72 <b>Sb</b> Antimony 51	73 <b>Te</b> Tellurium 52	74 <b>I</b> Iodine 53	75 <b>Xe</b> Xenon 54	
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71	204 <b>Pb</b> Lead 82	205 <b>Bi</b> Bismuth 83	206 <b>Po</b> Polonium 84	207 <b>At</b> Astatine 85	208 <b>Rn</b> Radon 86		
87 <b>Fr</b> Francium	88 <b>Ra</b> Radium	140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	142 <b>Nd</b> Neodymium 60	143 <b>Pm</b> Promethium 61	144 <b>Sm</b> Samarium 62	145 <b>Eu</b> Europium 63	146 <b>Gd</b> Gadolinium 64	147 <b>Tb</b> Terbium 65	148 <b>Dy</b> Dysprosium 66	149 <b>Ho</b> Holmium 67	150 <b>Er</b> Erbium 68	151 <b>Tm</b> Thulium 69	152 <b>Yb</b> Ytterbium 70	153 <b>Lu</b> Lutetium 71	204 <b>Pb</b> Lead 82	205 <b>Bi</b> Bismuth 83	206 <b>Po</b> Polonium 84	207 <b>At</b> Astatine 85	208 <b>Rn</b> Radon 86		
		232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	239 <b>Pa</b> Protactinium 91	240 <b>Np</b> Neptunium 93	241 <b>Pu</b> Plutonium 94	242 <b>Am</b> Americium 95	243 <b>Cm</b> Curium 96	244 <b>Bk</b> Berkelium 97	245 <b>Cf</b> Californium 98	246 <b>Es</b> Einsteinium 99	247 <b>Fm</b> Fermium 100	248 <b>Md</b> Mendelevium 101	249 <b>No</b> Nobelium 102	250 <b>Lr</b> Lawrencium 103							

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

a = relative atomic mass

X = atomic symbol

b = proton (atomic) number

Key

a	<b>X</b>
b	

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

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.