UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/12**

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.

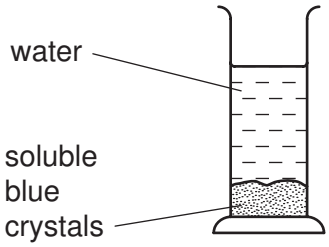
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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 20.

This document consists of **17** printed pages and **3** blank pages.

1 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

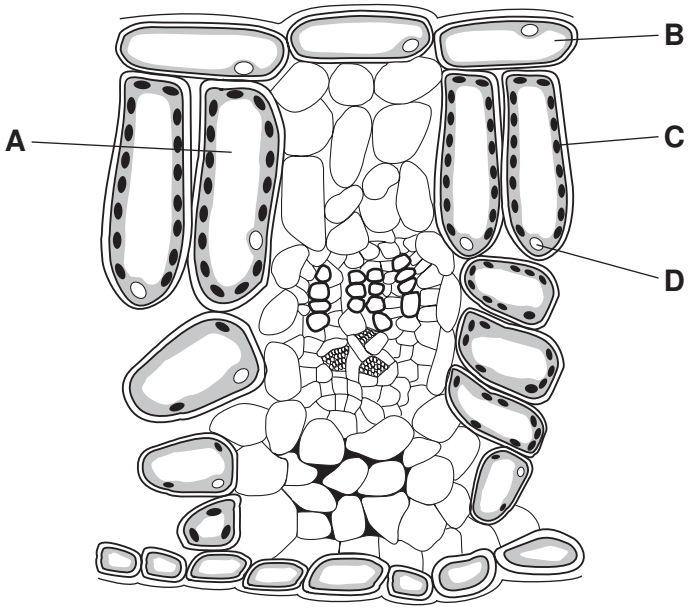
B diffusion

C digestion

D evaporation

2 The diagram shows a section through a green leaf.

Where are carbohydrates made?



3 Which part of a cell has the greatest mass?

A cytoplasm

B membrane

C nucleus

D vacuole

4 Which vessels carry blood towards the heart?

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

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

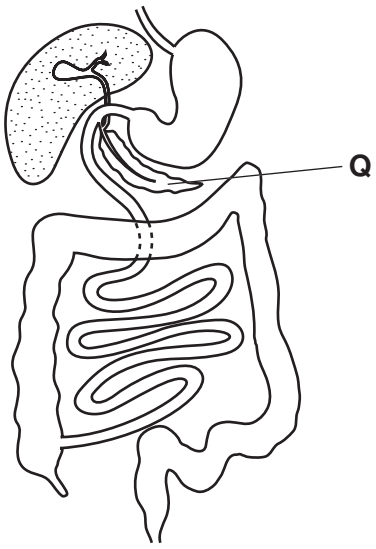
A She should eat less fat.

B She should eat more protein.

C She should eat less carbohydrate.

D She should eat more fibre.

6 The diagram shows the human alimentary canal.



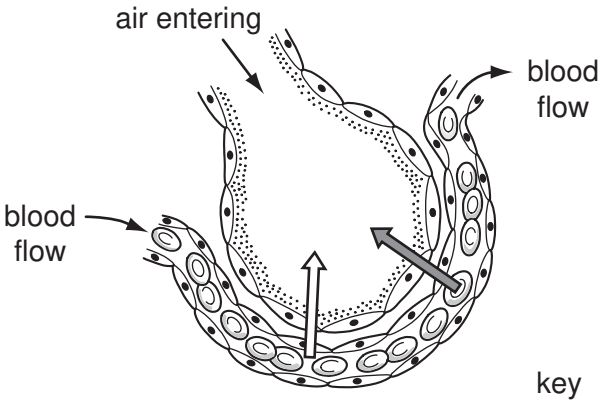
Proteases are produced by structure **Q**.

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

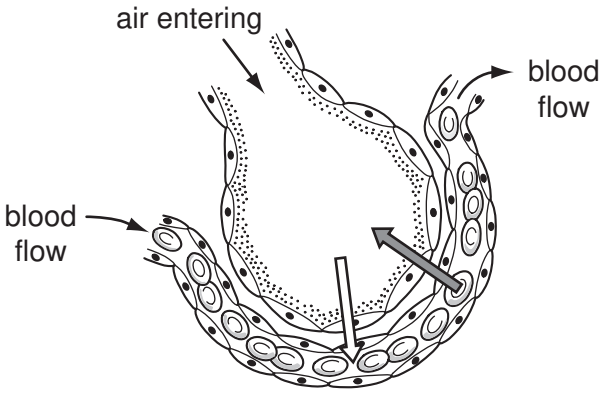
	structure **Q**	nutrient digested
A	liver	fat
B	liver	protein
C	pancreas	fat
D	pancreas	protein

7 Which diagram shows the diffusion of carbon dioxide and oxygen between an alv[illegible] a capillary?

A



B

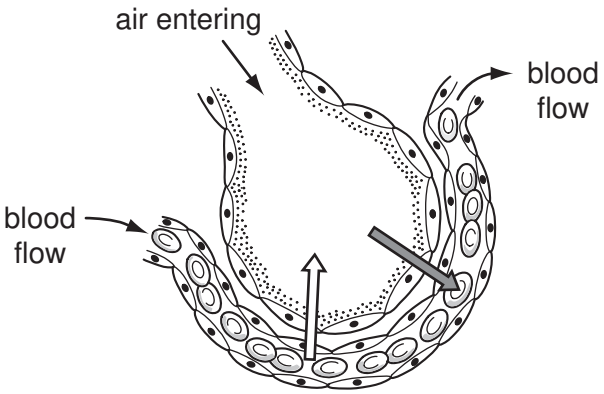


key

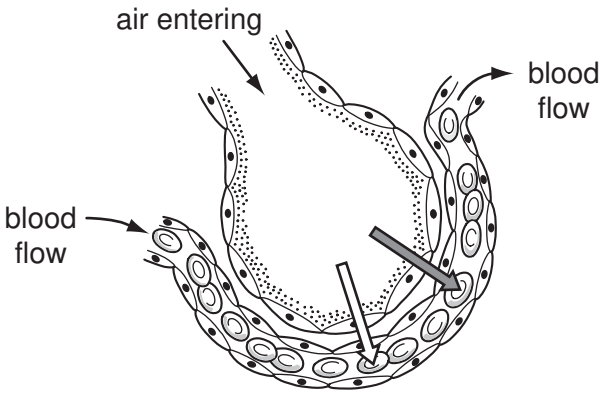
carbon dioxide

oxygen

C



D



8 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

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 Allele T is dominant over allele t.

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

A tt × tt **B** Tt × Tt **C** Tt × tt **D** TT × tt

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

A asexual reproduction

B fertilisation

C germination

D pollination

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

Which process does **not** do so?

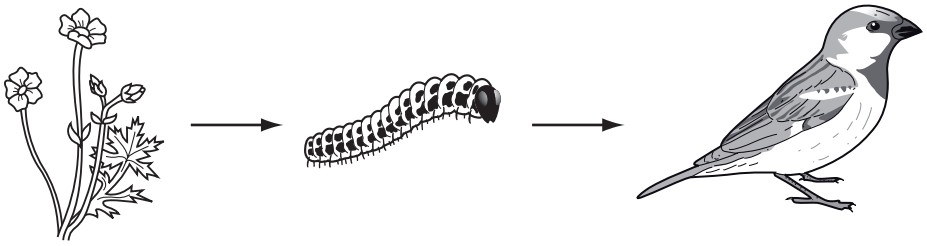
A combustion

B decomposition

C photosynthesis

D respiration

13 The diagram shows a food chain.



plant caterpillar bird

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

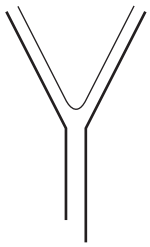
14 What are the charge and mass of an electron?

	charge	mass
A	+1	negligible
B	+1	1
C	–1	negligible
D	–1	1

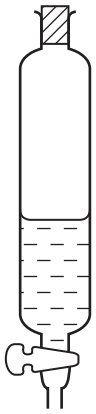
15 Hexane and octane are liquid hydrocarbons that mix together.

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

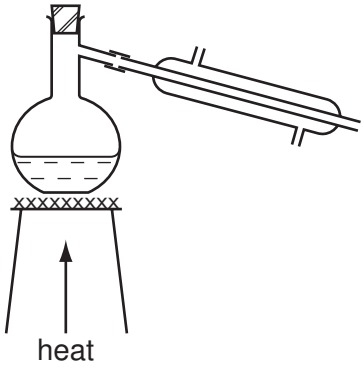
A



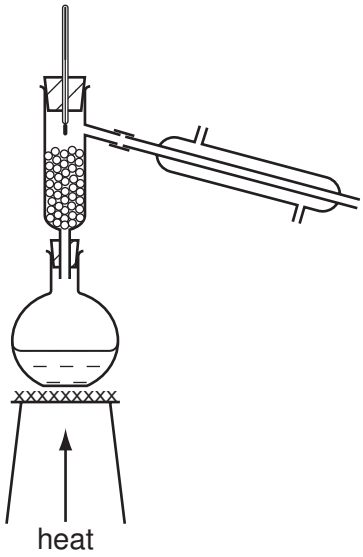
B



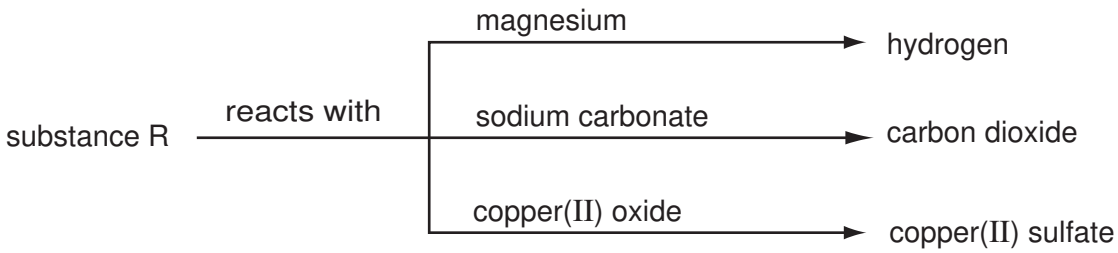
C



D



16 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

17 Hydrochloric acid reacts with calcium carbonate.

The equation for the reaction is shown.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$$

Which change increases the speed of the reaction?

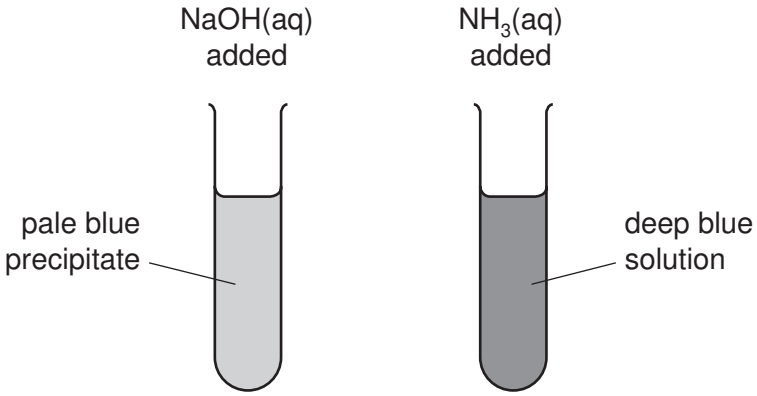
A Decrease the temperature of the hydrochloric acid.

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.

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

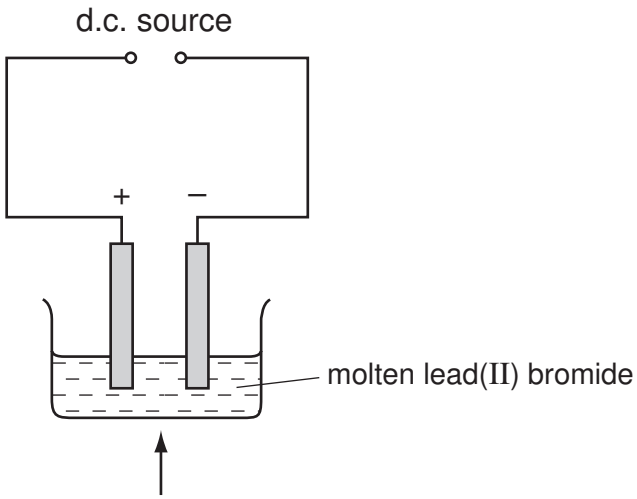


Which metal ion is present in salt S?

A Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}

19 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
A	bromine	anode
B	bromine	cathode
C	lead	anode
D	lead	cathode

20 Burning coal has advantages and disadvantages.

Which row is correct?

	the reaction is exothermic	the reaction can cause 'acid rain'
A	advantage	advantage
B	advantage	disadvantage
C	disadvantage	advantage
D	disadvantage	disadvantage

21 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
A	compounds	All
B	compounds	Some
C	mixtures	All
D	mixtures	Some

22 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
A	X	Y	Z
B	X	Z	Y
C	Y	Z	X
D	Z	X	Y

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

Which row is correct?

	element	oxide
A	transition metal	acidic
B	transition metal	basic
C	non-metal	acidic
D	non-metal	basic

24 The atoms of two elements can be represented by $^{4}_{2}X$ and $^{20}_{10}Y$.

Which properties do both elements have?

	they are gaseous	they are unreactive
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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

A diesel fuel

B ethanol

C paraffin

D petrol

26 Which three elements do most fertilisers contain?

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

27 Which process produces molecules with long chains?

A combustion of hydrocarbons

B cracking

C fractional distillation of petroleum

D polymerisation

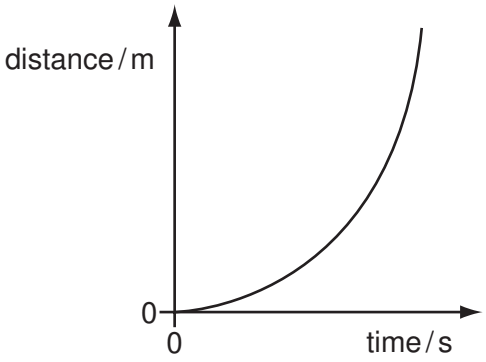
28 What is the density of an object that has a mass of 20 g and a volume of 5 cm^3?

A 4 g/cm^3 **B** 15 g/cm^3 **C** 25 g/cm^3 **D** 100 g/cm^3

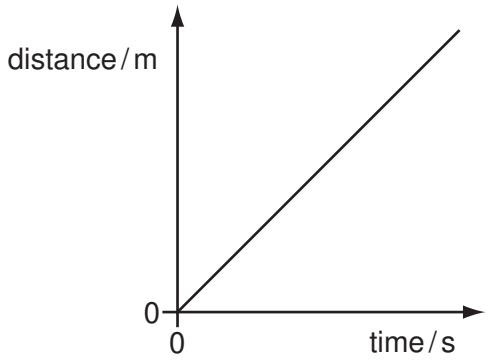
29 The following are distance / time graphs.

Which graph shows an object travelling at constant speed?

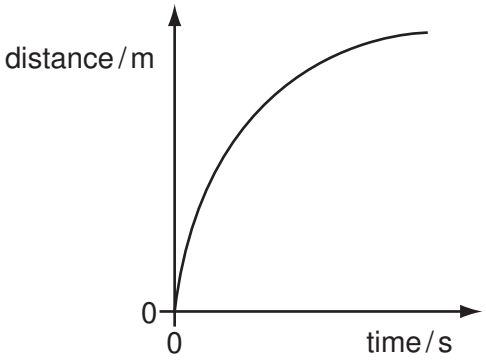
A



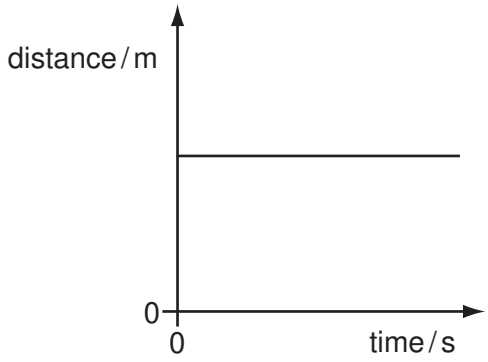
B



C



D



30 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.

31 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.

32 Which is a non-renewable energy resource?

A coal

B geothermal

C solar

D wave

33 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.

34 Diagram 1 represents a wave.

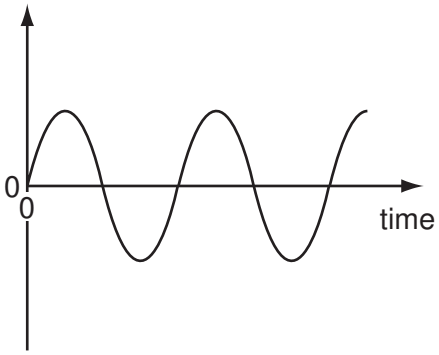
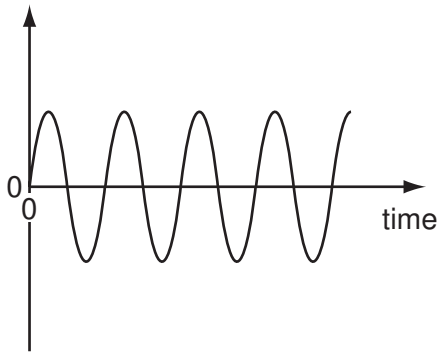


diagram 1

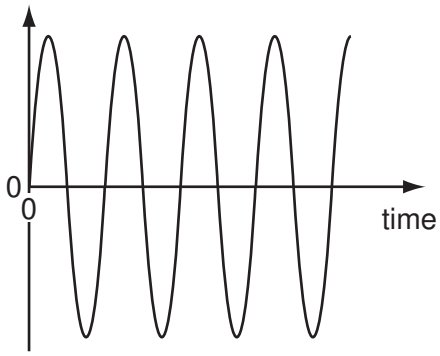
Which diagram represents a wave with double the frequency and half the amplitude of the wave in diagram 1?

The scales are the same in all the diagrams.

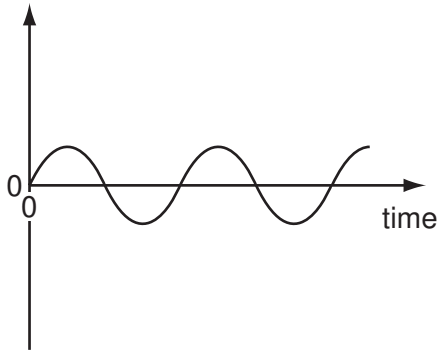
A



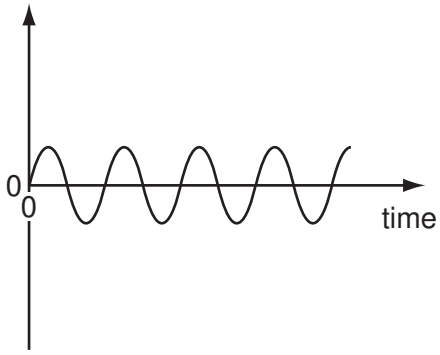
B



C

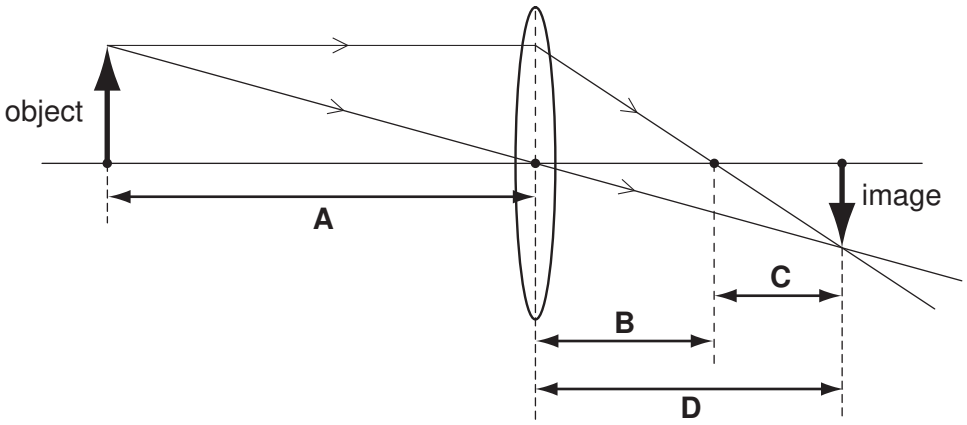


D

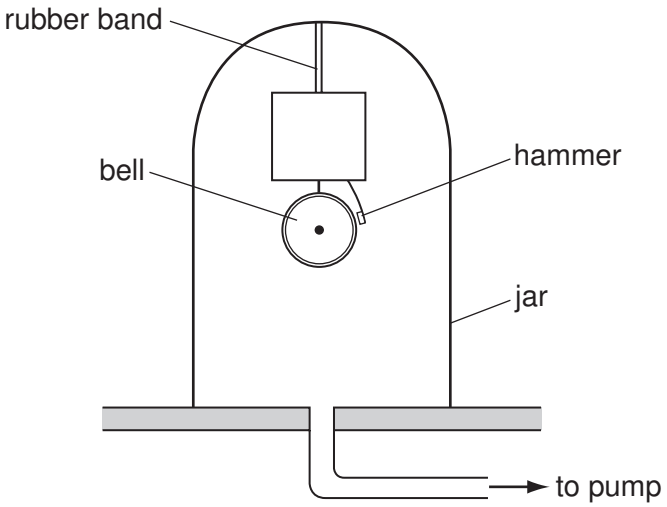


35 The diagram shows how a real image is formed by a converging lens.

Which distance is the focal length of the lens?



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

Which meter(s) does she need?

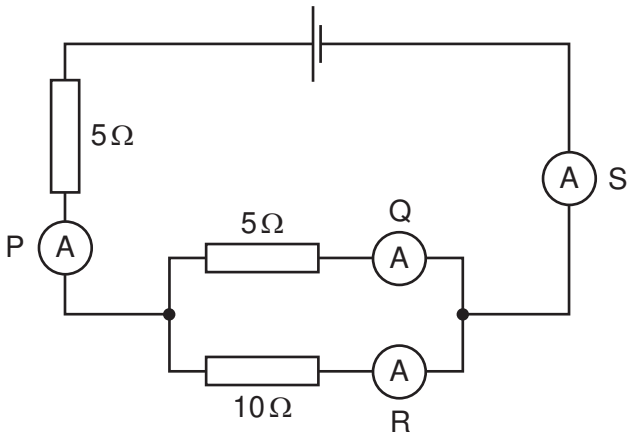
A an ammeter only

B a voltmeter only

C a voltmeter and an ammeter

D a voltmeter and a newton meter

38 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.

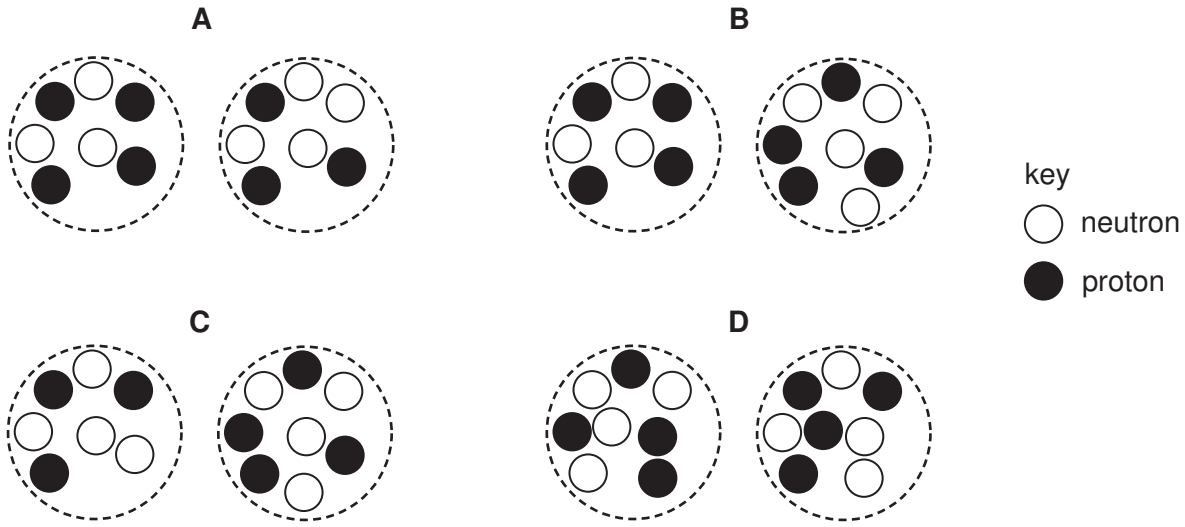
B The reading on Q is greater than the reading on S.

C The reading on R is less than the reading on S.

D The reading on Q is greater than the reading on P.

39 The diagrams represent pairs of nuclei of some atoms.

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



40 Which type of radiation has the greatest ionising effect?

A α–particles

B β–particles

C γ–rays

D infra red rays

BLANK PAGE

BLANK PAGE

BLANK PAGE

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
							1 H Hydrogen 1									4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
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	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	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	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	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

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.).