



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/01**

Paper 1 Multiple Choice

**May/June 2008**

**45 minutes**

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

\* 8 4 3 7 2 3 3 0 2 1 \*

**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 **20** printed pages.

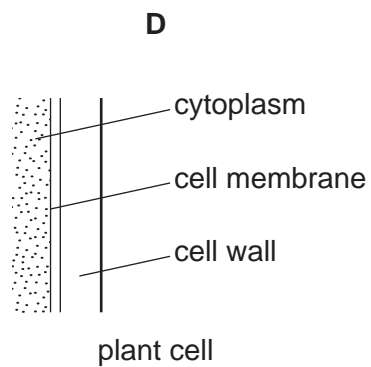
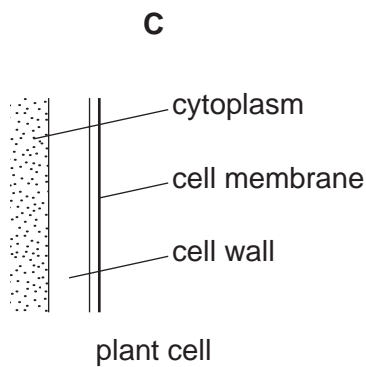
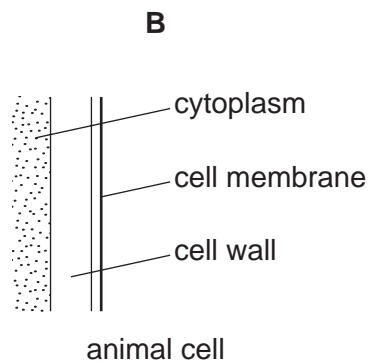
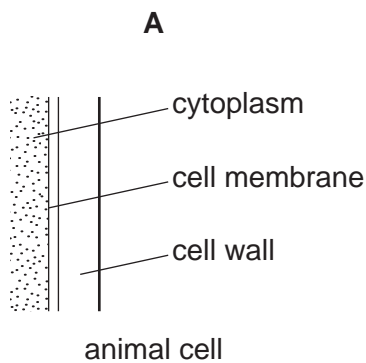


- 1 The diagram shows an animal whose scientific name is *Falco tinniculus*.

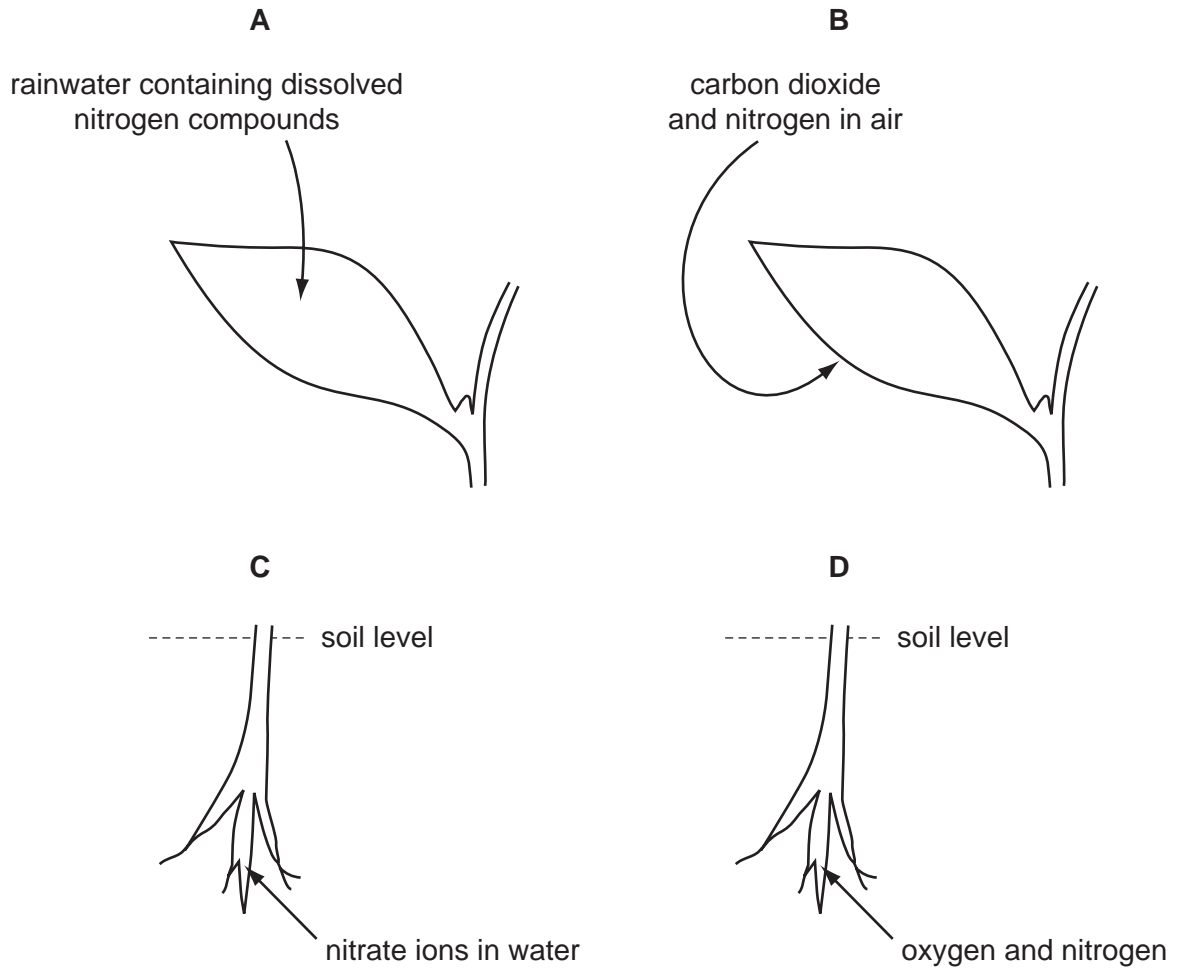


To which species does it belong?

- A bird
  - B *Falco*
  - C *tinniculus*
  - D vertebrate
- 2 Which diagram shows the position of the cell wall?



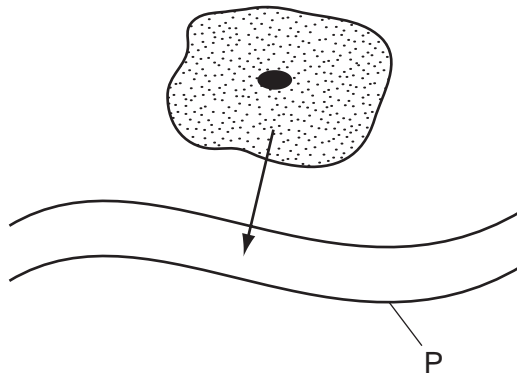
3 Which diagram shows how plants obtain chemicals for making proteins?



4 What is the purpose of respiration?

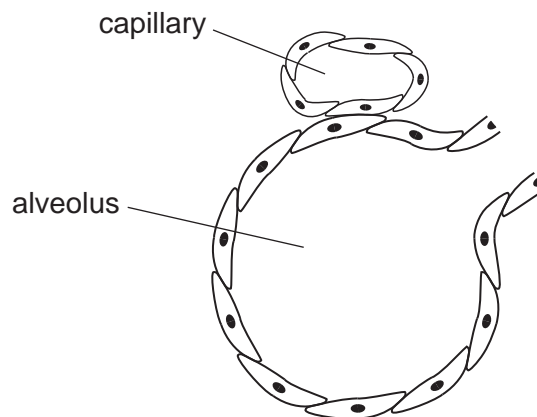
- A** to improve breathing
- B** to produce carbon dioxide
- C** to release energy
- D** to use up oxygen

- 5 The arrow shows urea leaving a cell and passing into structure P.



What is P?

- A a capillary
  - B an artery
  - C a vein
  - D the small intestine
- 6 The diagram shows a section through an alveolus and a blood capillary.



Why does oxygen move from the alveolus to the blood capillary?

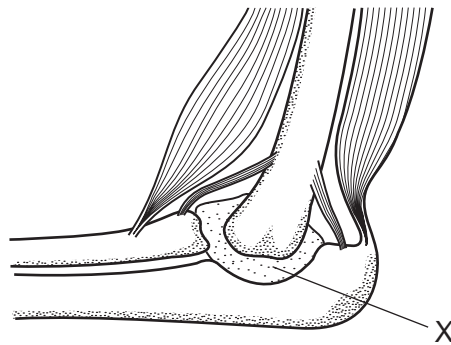
- A It diffuses through because of a difference in concentration.
- B It is forced through the wall of the alveolus by air pressure.
- C It passes through because carbon dioxide is coming out.
- D It is sucked in by movement of blood in the capillary.

7 Kwashiorkor is a disease that affects young children who do not have enough protein to eat.

Which is the best food to add to a diet largely of carbohydrate to prevent kwashiorkor?

- A bread
- B fish
- C fruit
- D rice

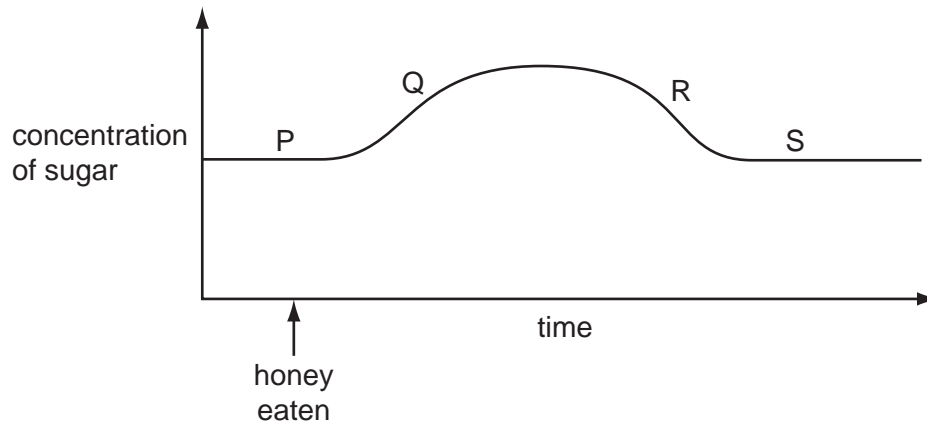
8 The diagram shows a section through the elbow joint.



What is the purpose of the liquid at X?

- A to carry oxygen
- B to cause movement
- C to cool the joint
- D to reduce friction

- 9 The graph shows changes in the concentration of sugar in the blood after a person has eaten a spoonful of honey.



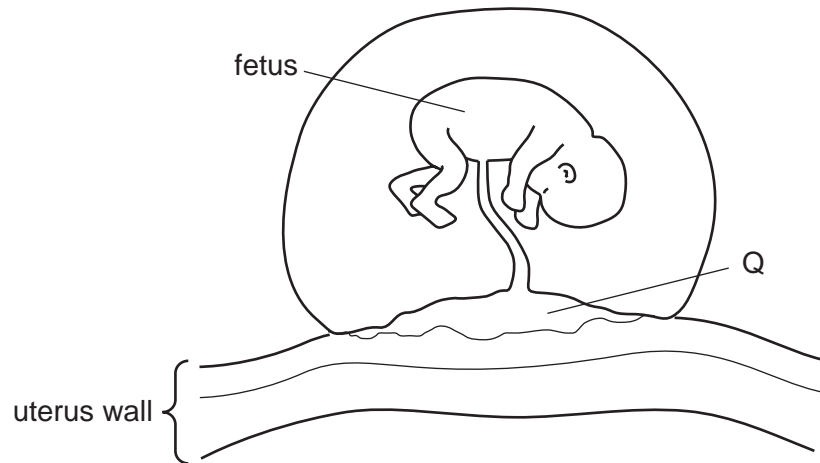
At which points on the curve is insulin being produced?

	P	Q	R	S
A	no	yes	yes	no
B	yes	no	no	no
C	no	yes	no	yes
D	yes	yes	yes	no

- 10 In a plant, what leads to offspring that are identical to the parent?

- A asexual reproduction
- B insect-pollination
- C seed dispersal
- D self-fertilisation

11 The diagram shows a developing fetus attached to the uterus wall.



What is the function of Q?

- A filtering amniotic fluid
  - B passing blood from the mother to the fetus
  - C supplying oxygen to the fetus
  - D supplying urea to the fetus
- 12 What, together with the habitat in which it lives, forms an ecosystem?
- A a class
  - B a community
  - C a population
  - D a species
- 13 What must be controlled to protect the habitat of an endangered species?
- A decomposers
  - B nitrogen fixation
  - C pollution
  - D rainfall

14 What do the chemical symbols  $N_2$  and Ni represent?

	$N_2$	Ni
<b>A</b>	a compound	a compound
<b>B</b>	a compound	an element
<b>C</b>	an element	a compound
<b>D</b>	an element	an element

15 The metal titanium occurs naturally combined with oxygen.

The table shows the combining powers of the elements in this compound.

element	symbol	combining power
oxygen	O	2
titanium	Ti	4

What could be the formula of the compound?

- A**  $TiO_2$       **B**  $Ti_2O$       **C**  $TiO_4$       **D**  $Ti_4O_2$

16 Which trends in physical properties are correct for the alkali metals down Group I?

	hardness	melting point
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

17 Processes used in the petrochemical industry include

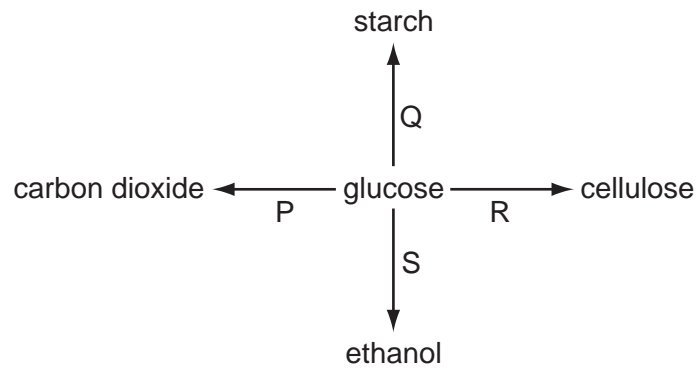
- 1 cracking.
- 2 distillation.

For which of these processes is a catalyst used?

- A** both 1 and 2  
**B** 1 only  
**C** 2 only  
**D** neither 1 nor 2



18 The reactions of glucose are shown.



Which two reactions involve polymerisation?

- A** P and Q      **B** P and R      **C** Q and R      **D** R and S

19 An alloy is used for making an aircraft body.

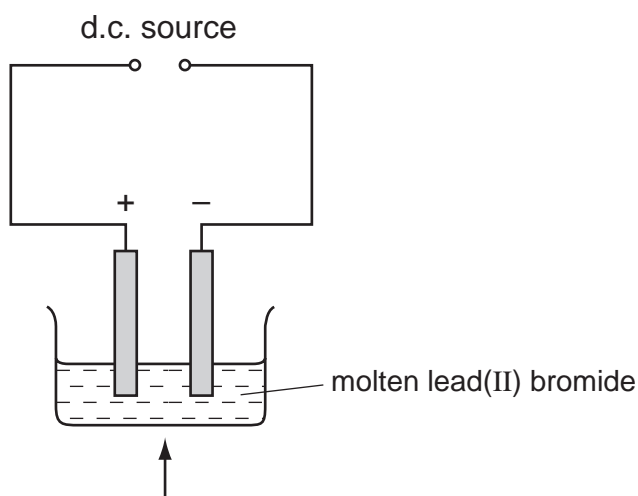
Which properties does this alloy need to have?

	low density	high electrical conductivity
<b>A</b>	no	no
<b>B</b>	no	yes
<b>C</b>	yes	no
<b>D</b>	yes	yes

20 How is carbon (coke) used in the extraction of iron from iron oxide?

- A** as an anode  
**B** as a cathode  
**C** as an oxidising agent  
**D** as a reducing agent

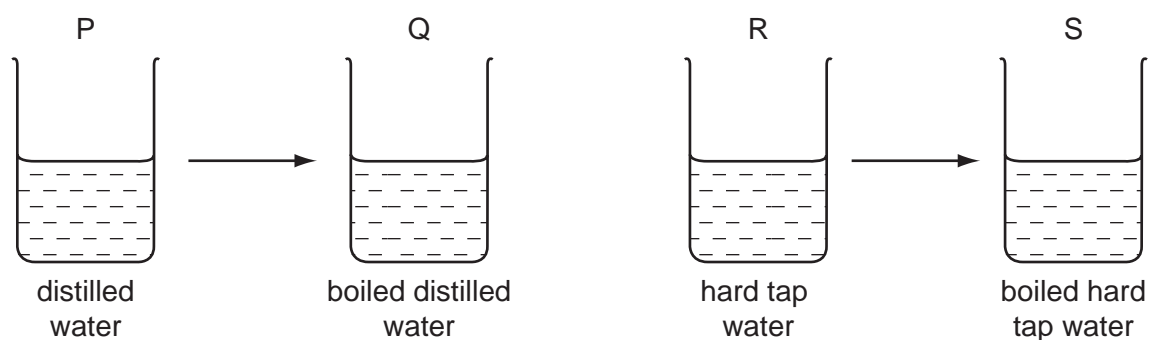
- 21 Molten lead(II) bromide is electrolysed as shown. An element is deposited on the negative electrode.



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

- 22 Soap solution is gradually added to separate samples of water P, Q, R and S until a lather forms.



How does boiling affect the volume of soap solution needed for a lather?

	P → Q	R → S
<b>A</b>	no change	S needs less
<b>B</b>	no change	S needs more
<b>C</b>	Q needs more	S needs less
<b>D</b>	Q needs more	S needs more

23 Ammonia and sulphur dioxide are bubbled into separate samples of water.

What are the pH values of the resulting solutions?

	aqueous ammonia	aqueous sulphur dioxide
<b>A</b>	higher than 7	higher than 7
<b>B</b>	higher than 7	lower than 7
<b>C</b>	lower than 7	higher than 7
<b>D</b>	lower than 7	lower than 7

24 Fertilisers are used to supply the essential elements needed for plant growth.

Which compound supplies two of these essential elements?

- A**  $\text{Ca}(\text{H}_2\text{PO}_4)_2$
- B**  $\text{Ca}(\text{NO}_3)_2$
- C**  $\text{KNO}_3$
- D**  $(\text{NH}_4)_2\text{SO}_4$

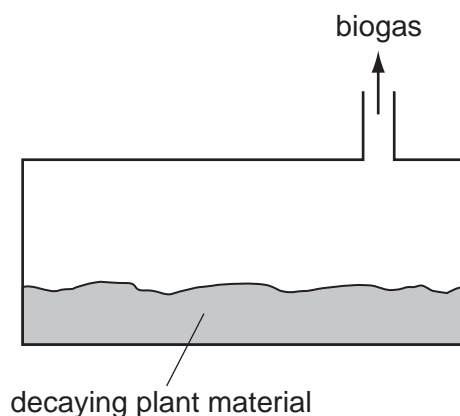
25 The use of .....1..... to cure .....2..... is known as .....3..... .

Which words correctly complete gaps 1, 2 and 3?

	1	2	3
<b>A</b>	drugs	acidity	chromatography
<b>B</b>	drugs	cancer	chemotherapy
<b>C</b>	dyes	acidity	chromatography
<b>D</b>	emulsifiers	pollution	chemotherapy

26 Biogas is a mixture of gases. It is used as a fuel.

The diagram shows a biogas generator.



Which gas in the mixture burns?

- A methane
- B nitrogen
- C oxygen
- D water vapour

27 A student tests two solutions.

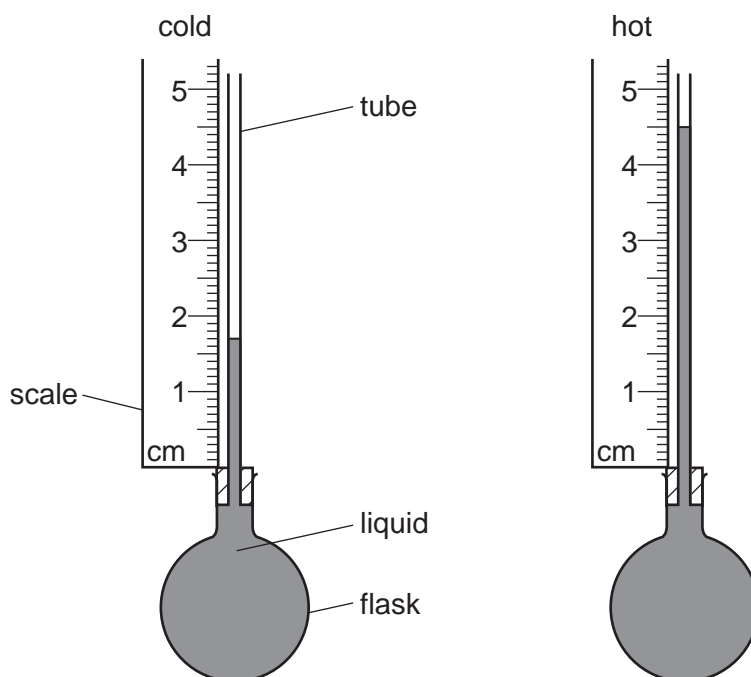
One solution is an aqueous copper salt. The other is an aqueous sodium salt.

How can the colours of the solutions and of flame tests show which solution is which?

	colour of solution		colour of flame	
	copper	sodium	copper	sodium
<b>A</b>	blue	colourless	blue	colourless
<b>B</b>	blue	colourless	green	yellow
<b>C</b>	green	yellow	blue	colourless
<b>D</b>	green	yellow	green	yellow

28 Some liquid is heated in a flask.

The diagrams show the height of the liquid in the tube when the liquid is cold and when it is hot.

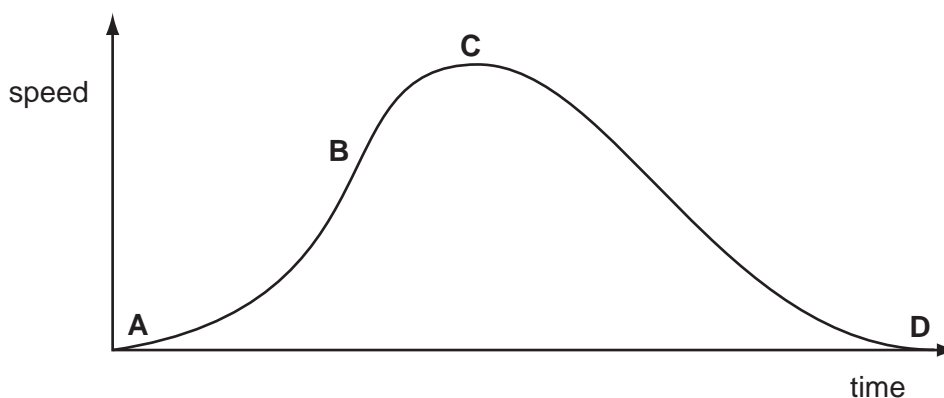


What is the difference in the heights?

- A** 1.7 cm      **B** 2.8 cm      **C** 3.2 cm      **D** 4.5 cm

29 The speed-time graph shown is for a bus travelling between stops.

Where on the graph is the acceleration of the bus the greatest?

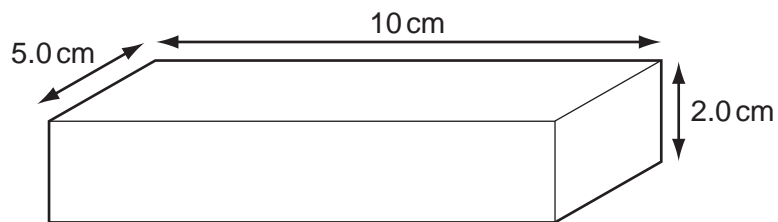


- 30 The circuit of a motor racing track is 3 km in length. In a race, a car goes 25 times round the circuit in 30 minutes.

What is the average speed of the car?

- A 75 km/hour
- B 90 km/hour
- C 150 km/hour
- D 750 km/hour

- 31 The diagram shows a rectangular metal block measuring 10 cm × 5.0 cm × 2.0 cm.

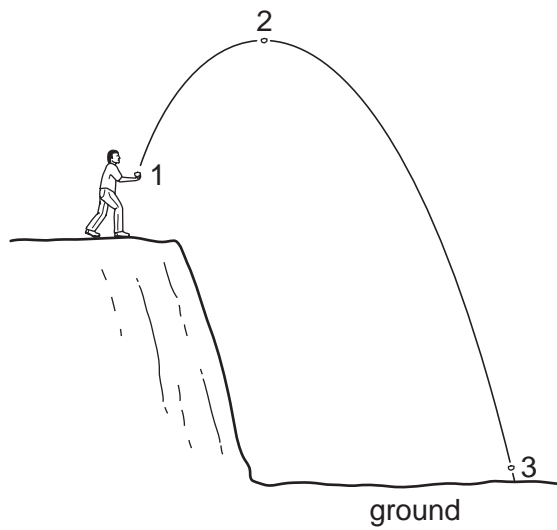


Its mass is 250 g.

What is the density of the metal?

- A  $0.20 \text{ g/cm}^3$
- B  $0.40 \text{ g/cm}^3$
- C  $2.5 \text{ g/cm}^3$
- D  $5.0 \text{ g/cm}^3$

32 A stone is thrown from the edge of a cliff. Its path is shown in the diagram.

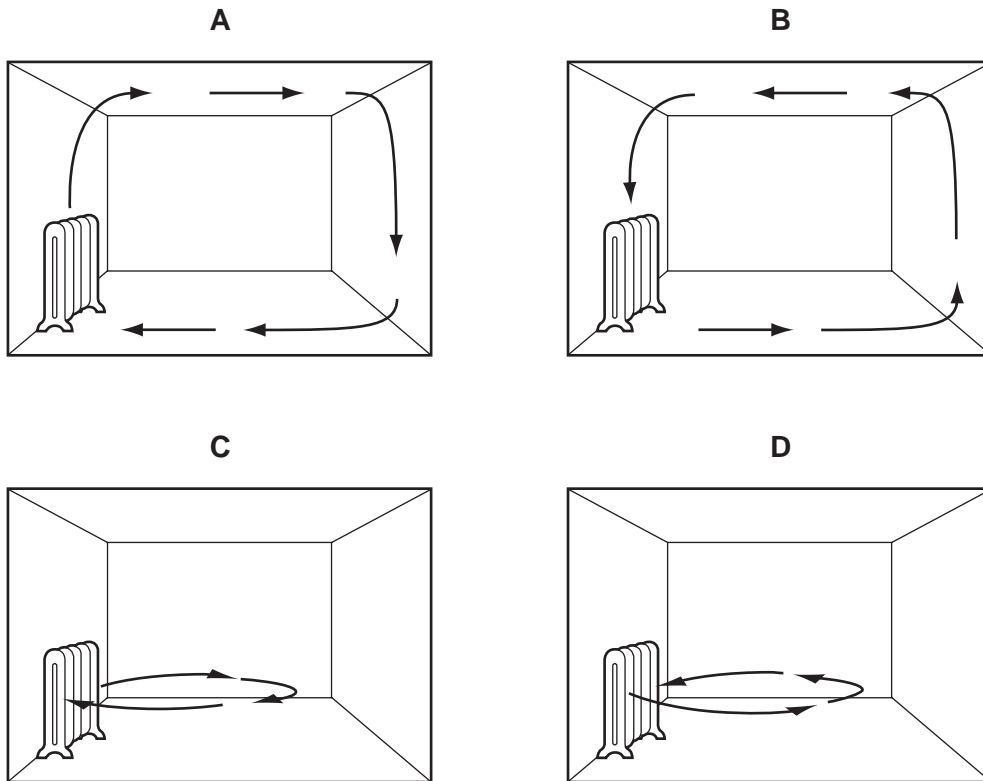


In which position does the stone have its greatest kinetic energy and in which position does it have its lowest potential energy?

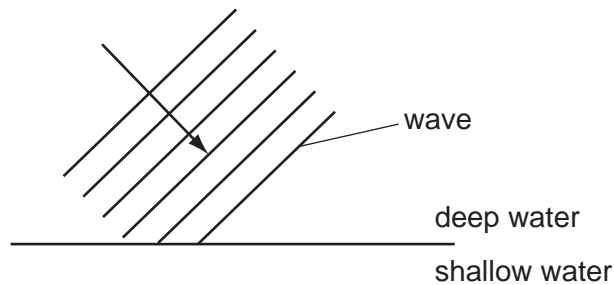
	greatest kinetic energy	lowest potential energy
<b>A</b>	1	2
<b>B</b>	2	3
<b>C</b>	3	1
<b>D</b>	3	3

33 A heater is placed in a room.

Which diagram shows the movement of air as the room is heated?



34 The diagram represents water waves about to move into shallow water from deep water.

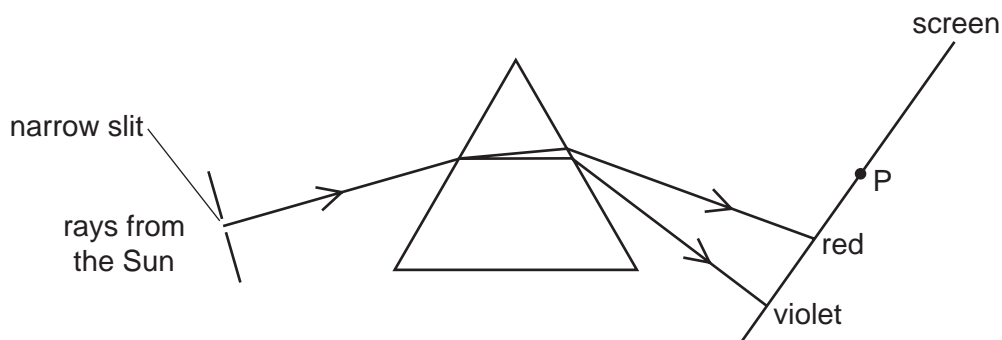


Which property of the waves remains the same after the waves move into shallow water?

- A frequency
- B speed
- C wave direction
- D wavelength



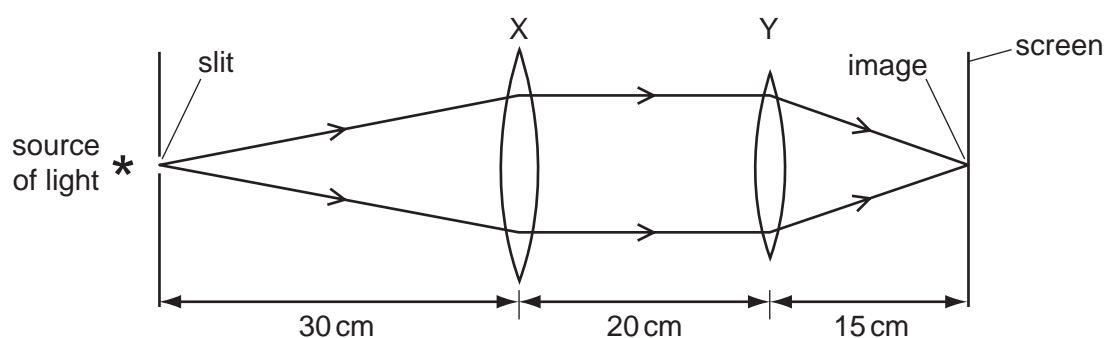
- 35 Rays from the Sun pass through a narrow slit and a spectrum is produced on a screen.



A thermometer placed at P shows a large temperature rise.

Which type of radiation causes this?

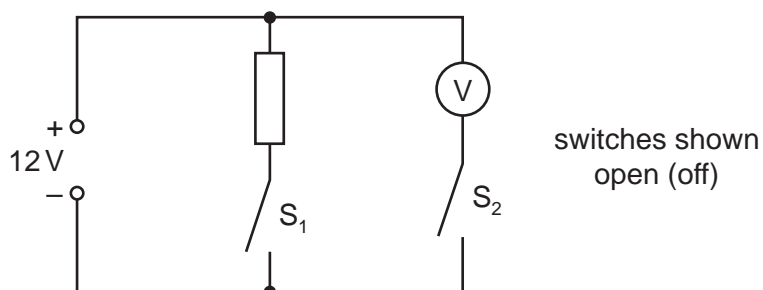
- A infra-red
  - B microwave
  - C ultraviolet
  - D visible light
- 36 Two thin converging lenses, X and Y, are used as shown to give a focused image of an illuminated slit. The rays shown are parallel between X and Y.



What are the correct values for the focal lengths of X and of Y?

	focal length of X/cm	focal length of Y/cm
<b>A</b>	50	35
<b>B</b>	30	20
<b>C</b>	30	15
<b>D</b>	20	20

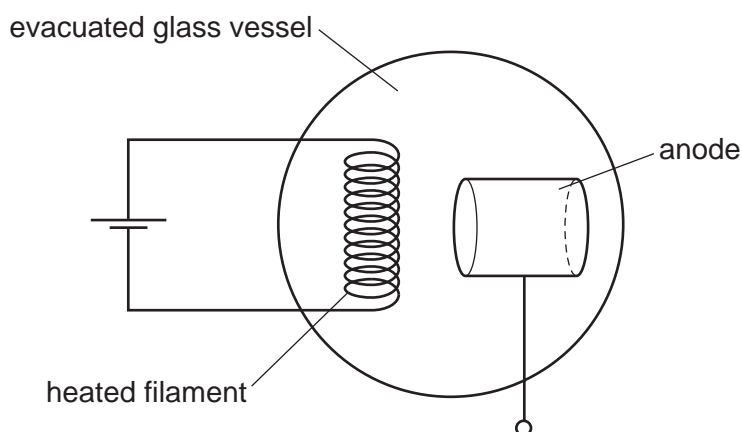
- 37 In the circuit shown, the switches  $S_1$  and  $S_2$  may be open (off) or closed (on).



Which line in the table shows the voltmeter reading for the switch positions given?

	$S_1$	$S_2$	voltmeter reading / V
<b>A</b>	open	open	12
<b>B</b>	closed	closed	12
<b>C</b>	open	closed	0
<b>D</b>	closed	open	12

- 38 In order to produce a beam of cathode rays, a heated filament is placed near to an anode in an evacuated glass vessel.



What is the type of charge given to the anode and why is this charge chosen?

	charge	reason
<b>A</b>	negative	to attract electrons
<b>B</b>	negative	to repel electrons
<b>C</b>	positive	to attract electrons
<b>D</b>	positive	to repel electrons

**39** There are three types of emission from radioactive substances.

Which types carry an electric charge?

- A** alpha radiation and beta radiation only
- B** alpha radiation and gamma radiation only
- C** beta radiation and gamma radiation only
- D** all three types

**40** A sample of radioactive uranium has mass 1g. Another sample of the same material has mass 2g.

Which property is the same for both samples?

- A** the amount of radiation emitted per second
- B** the half-life
- C** the number of uranium atoms
- D** the volume

**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	13 <b>Al</b> Aluminium 13	14 <b>Si</b> Silicon 14	15 <b>P</b> Phosphorus 15	16 <b>S</b> Sulphur 16	17 <b>Cl</b> Chlorine 17	35.5 <b>Ar</b> Argon 18																									
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	45 <b>Sc</b> Scandium 21	48 <b>Ti</b> Titanium 22	51 <b>V</b> Vanadium 23	52 <b>Cr</b> Chromium 24	55 <b>Mn</b> Manganese 25	56 <b>Fe</b> Iron 26	59 <b>Co</b> Cobalt 27	59 <b>Ni</b> Nickel 28	64 <b>Cu</b> Copper 29	65 <b>Zn</b> Zinc 30	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36															
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	89 <b>Y</b> Yttrium 39	91 <b>Zr</b> Zirconium 40	93 <b>Nb</b> Niobium 41	96 <b>Mo</b> Molybdenum 42	101 <b>Ru</b> Ruthenium 44	101 <b>Rh</b> Rhodium 45	103 <b>Rh</b> Rhodium 45	106 <b>Pd</b> Palladium 46	108 <b>Ag</b> Silver 47	112 <b>Cd</b> Cadmium 48	115 <b>In</b> Indium 49	119 <b>Sn</b> Tin 50	122 <b>Sb</b> Antimony 51	128 <b>Te</b> Tellurium 52	127 <b>I</b> Iodine 53	131 <b>Xe</b> Xenon 54															
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	139 <b>La</b> Lanthanum 57	178 <b>Hf</b> Hafnium 72	181 <b>Ta</b> Tantalum 73	184 <b>W</b> Tungsten 74	190 <b>Os</b> Osmium 76	192 <b>Ir</b> Iridium 77	195 <b>Pt</b> Platinum 78	197 <b>Au</b> Gold 79	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82	209 <b>Bi</b> Bismuth 83	210 <b>Po</b> Polonium 84	210 <b>At</b> Astatine 85	210 <b>Rn</b> Radon 86																
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89																															
*58-71 Lanthanoid series																																
†90-103 Actinoid series																																
<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 5%;"></td> <td style="width: 5%; text-align: left;">a</td> <td style="width: 5%; text-align: center;"><b>X</b></td> <td style="width: 5%; text-align: right;">b</td> <td style="width: 5%;"></td> <td style="width: 5%; text-align: left;">a = relative atomic mass</td> <td style="width: 5%; text-align: center;"><b>X</b></td> <td style="width: 5%; text-align: right;">b = proton (atomic) number</td> </tr> <tr> <td style="text-align: center;">Key</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>																		a	<b>X</b>	b		a = relative atomic mass	<b>X</b>	b = proton (atomic) number	Key							
	a	<b>X</b>	b		a = relative atomic mass	<b>X</b>	b = proton (atomic) number																									
Key																																
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	169 <b>Tm</b> Thulium 69	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71																		
		232 <b>Th</b> Thorium 90	238 <b>Pa</b> Protactinium 91	238 <b>U</b> Uranium 92	238 <b>Np</b> Neptunium 93	238 <b>Pu</b> Plutonium 94	238 <b>Am</b> Americium 95	238 <b>Cm</b> Curium 96	238 <b>Bk</b> Berkelium 97	238 <b>Cf</b> Californium 98	238 <b>Es</b> Einsteinium 99	238 <b>Fm</b> Fermium 100	238 <b>Md</b> Mendelevium 101	238 <b>No</b> Nobelium 102	238 <b>Lr</b> Lawrencium 103																	

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.