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)

*8437233021*

**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

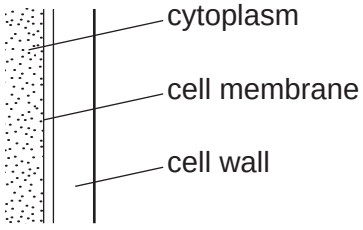
**B** *Falco*

**C** *tinniculus*

**D** vertebrate

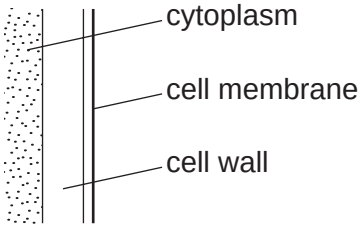
**2** Which diagram shows the position of the cell wall?

**A**



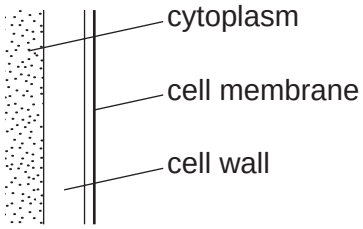

animal cell

**B**



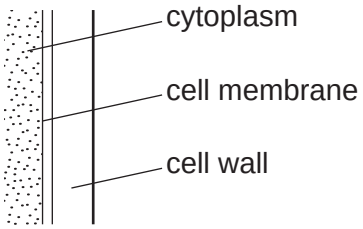

animal cell

**C**




plant cell

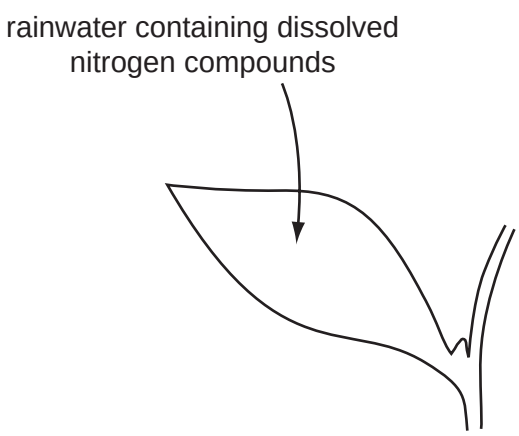
**D**



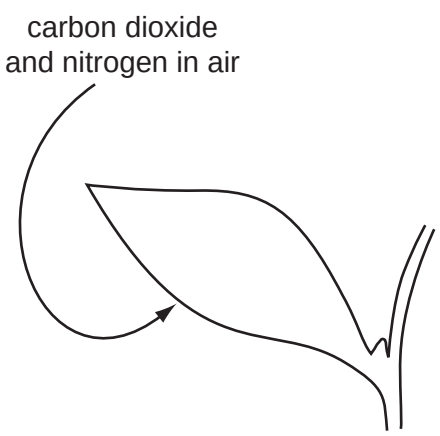

plant cell

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

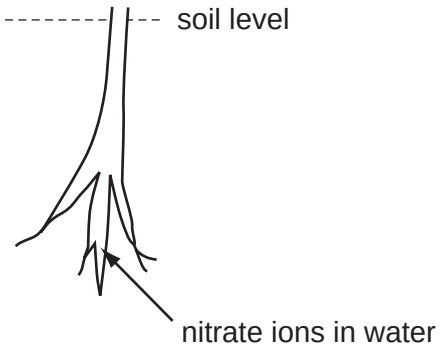
**A**



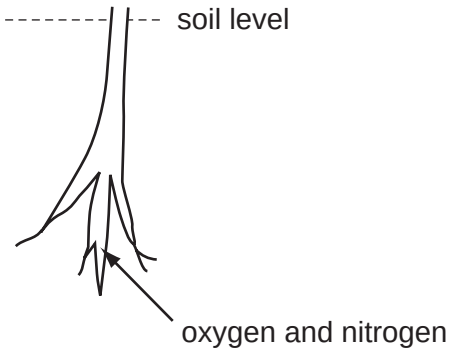

**B**




**C**




**D**




**4** What is the purpose of respiration?

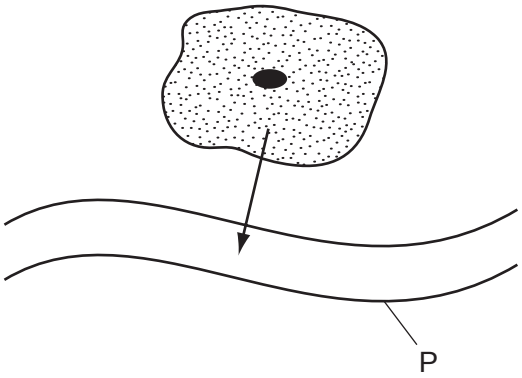
**A** to improve breathing

**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?

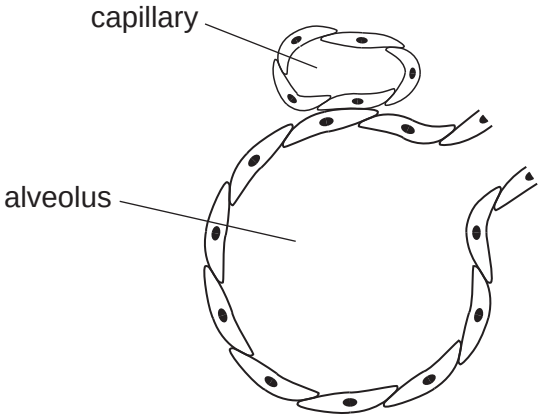
**A** a capillary

**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.

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

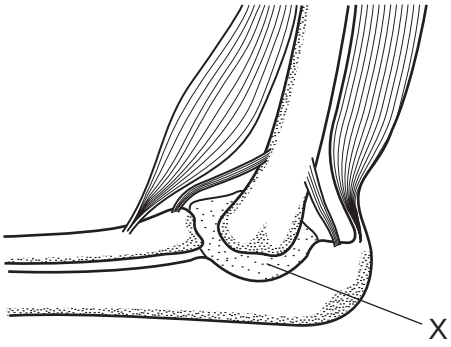
**A** bread

**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?

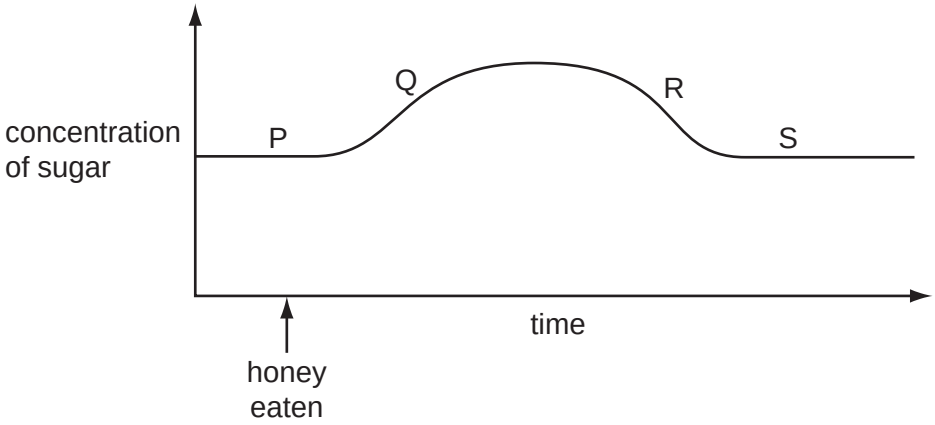
**A** to carry oxygen

**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 eats 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?

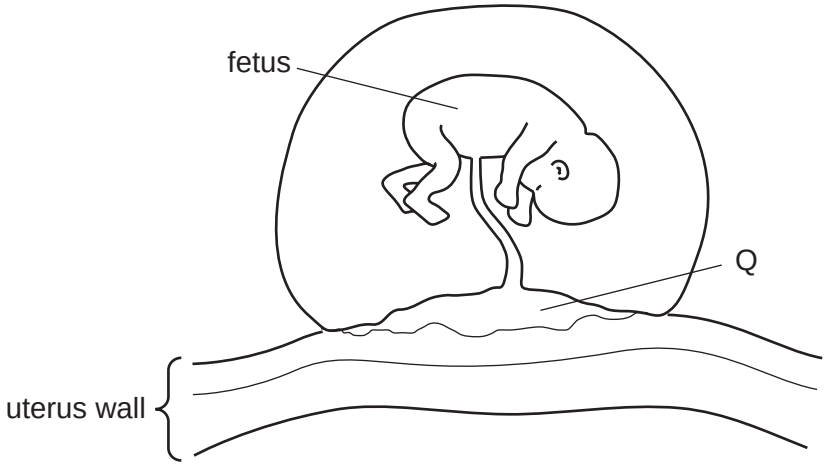
**A** asexual reproduction

**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 |
|---|---|---|
| **A** | a compound | a compound |
| **B** | a compound | an element |
| **C** | an element | a compound |
| **D** | 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 |
|---|---|---|
| **A** | decreases | decreases |
| **B** | decreases | increases |
| **C** | increases | decreases |
| **D** | increases | increases |

**17** Processes used in the petrochemical industry include

1 cracking.

2 distillation.

For which of these processes is a catalyst used?

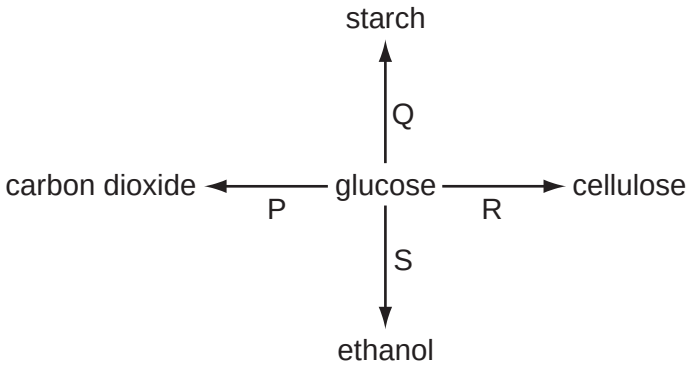
**A** both 1 and 2

**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 |
|---|---|---|
| **A** | no | no |
| **B** | no | yes |
| **C** | yes | no |
| **D** | yes | yes |

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

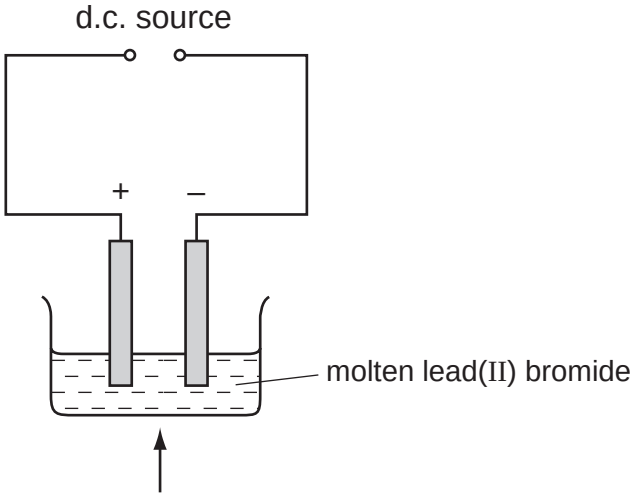
**A** as an anode

**B** as a cathode

**C** as an oxidising agent

**D** as a reducing agent

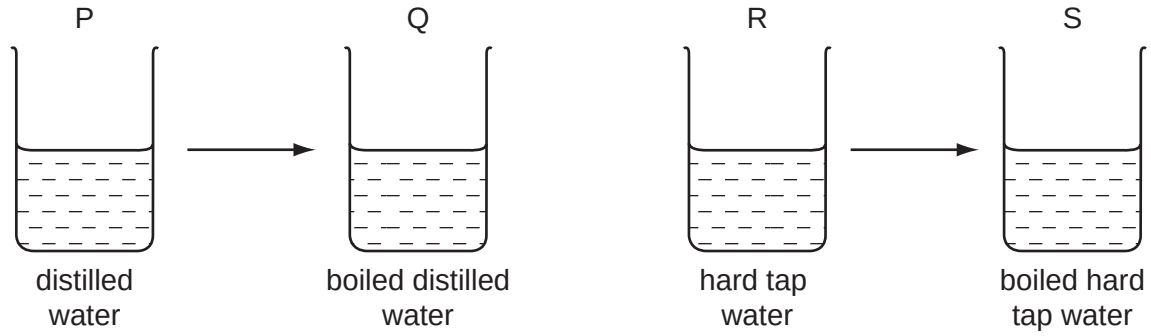
**21** Molten lead(II) bromide is electrolysed as shown. An element is deposited on the [illegible] electrode.




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 |

**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 |
|---|---|---|
| **A** | no change | S needs less |
| **B** | no change | S needs more |
| **C** | Q needs more | S needs less |
| **D** | 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 |
|---|---|---|
| **A** | higher than 7 | higher than 7 |
| **B** | higher than 7 | lower than 7 |
| **C** | lower than 7 | higher than 7 |
| **D** | 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** $Ca(H_2PO_4)_2$

**B** $Ca(NO_3)_2$

**C** $KNO_3$

**D** $(NH_4)_2SO_4$

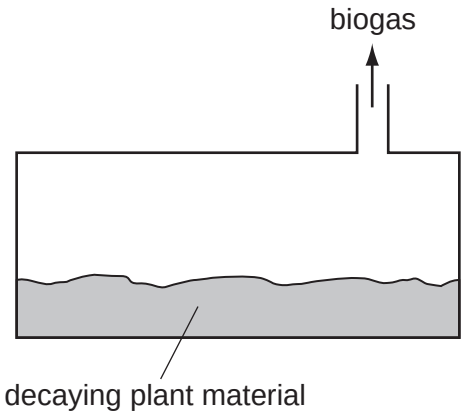
**25** The use of ……1…… to cure ……2…… is known as ……3…… .

Which words correctly complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|---|---|---|---|
| **A** | drugs | acidity | chromatography |
| **B** | drugs | cancer | chemotherapy |
| **C** | dyes | acidity | chromatography |
| **D** | 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.

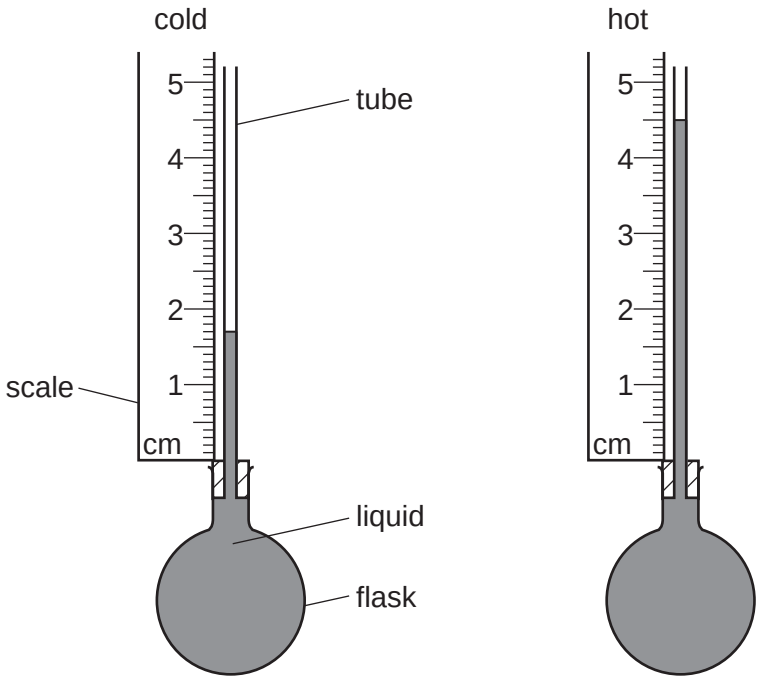
One solution is an aqueous copper salt. The other is an aqueous sodium salt.

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 |
| **A** | blue | colourless | blue | colourless |
| **B** | blue | colourless | green | yellow |
| **C** | green | yellow | blue | colourless |
| **D** | 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

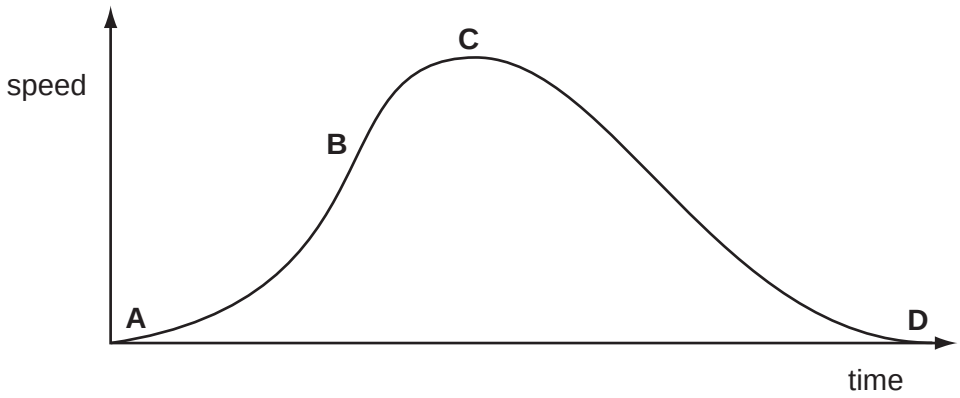



What is the difference in the heights?

**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 around the circuit in 30 minutes.

What is the average speed of the car?

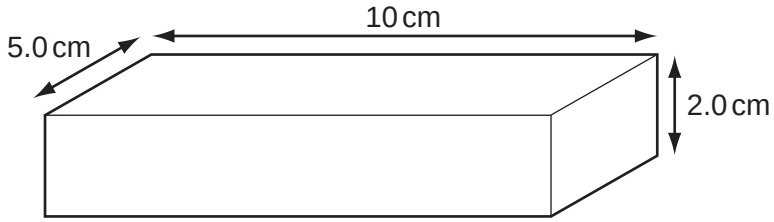
**A** 75 km / hour

**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.

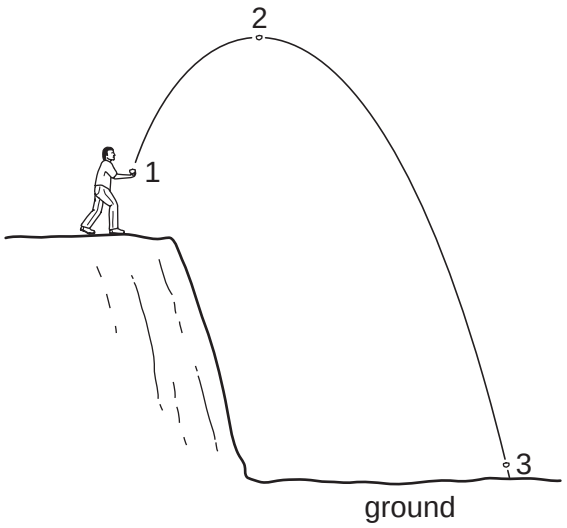



Its mass is 250 g.

What is the density of the metal?

**A** 0.20 g / $cm^3$ **B** 0.40 g / $cm^3$ **C** 2.5 g / $cm^3$ **D** 5.0 g / $cm^3$

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



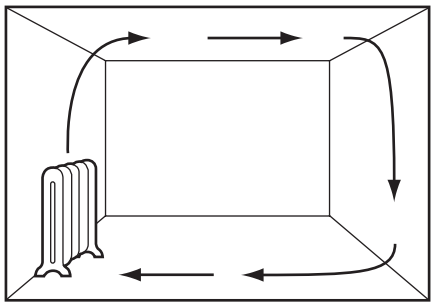

In which position does the stone have its greatest kinetic energy and in which position does it have its lowest potential energy?

| | greatest kinetic energy | lowest potential energy |
|---|---|---|
| **A** | 1 | 2 |
| **B** | 2 | 3 |
| **C** | 3 | 1 |
| **D** | 3 | 3 |

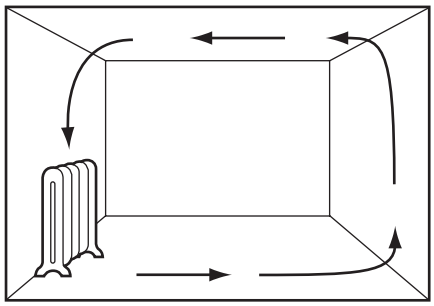
**33** A heater is placed in a room.

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

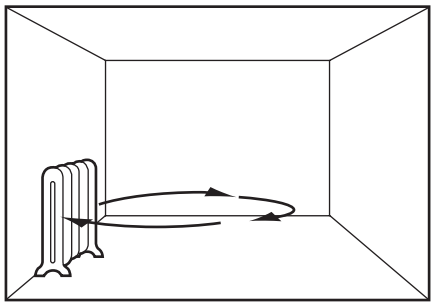
**A**



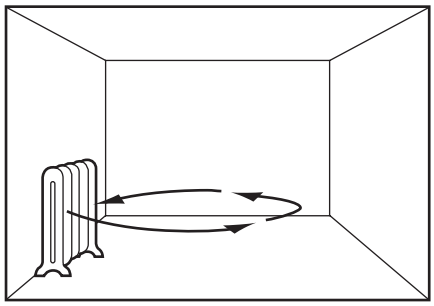
**B**



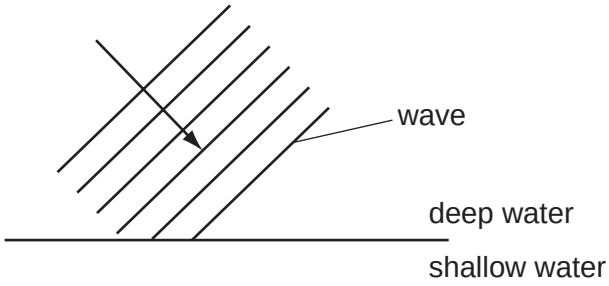
**C**



**D**



**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?

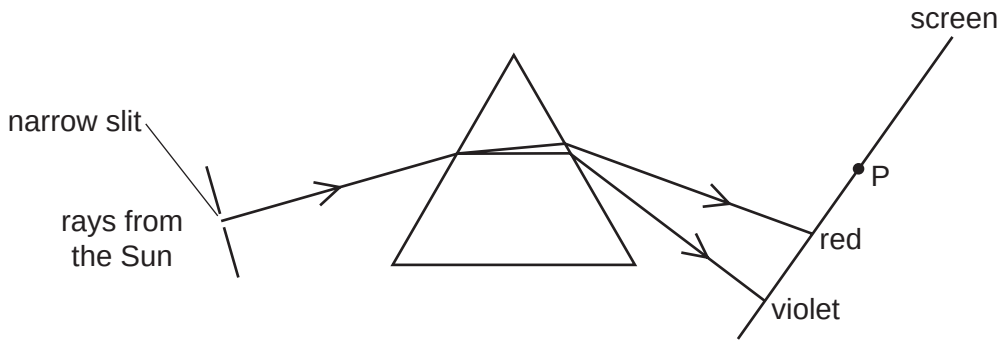
**A** frequency

**B** speed

**C** wave direction

**D** wavelength

**35** Rays from the Sun pass through a prism and a spectrum is produced on a screen.




A thermometer placed at P shows a large temperature rise.

Which type of radiation causes this?

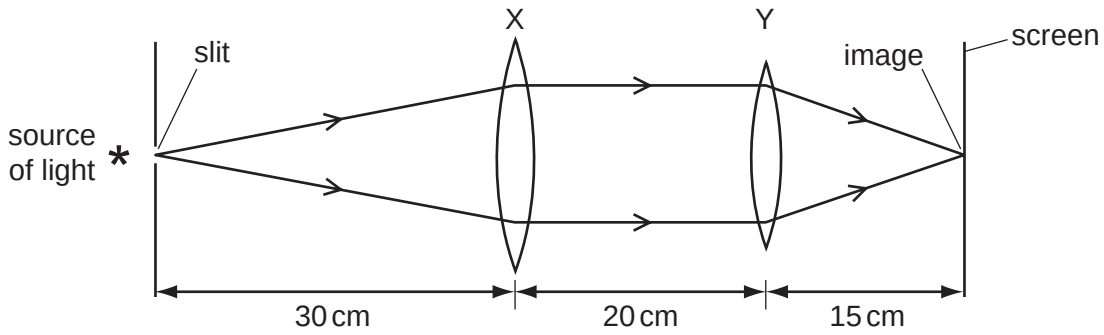
**A** infra-red

**B** microwave

**C** ultraviolet

**D** visible light

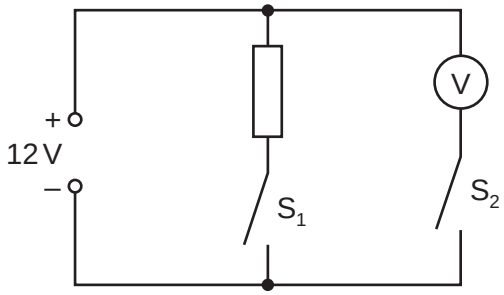
**36** Two thin converging lenses, X and Y, are used as shown to give a focused image of an illuminated slit. The rays shown are parallel between X and Y.




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

| | focal length of X / cm | focal length of Y / cm |
|---|---|---|
| **A** | 50 | 35 |
| **B** | 30 | 20 |
| **C** | 30 | 15 |
| **D** | 20 | 20 |

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

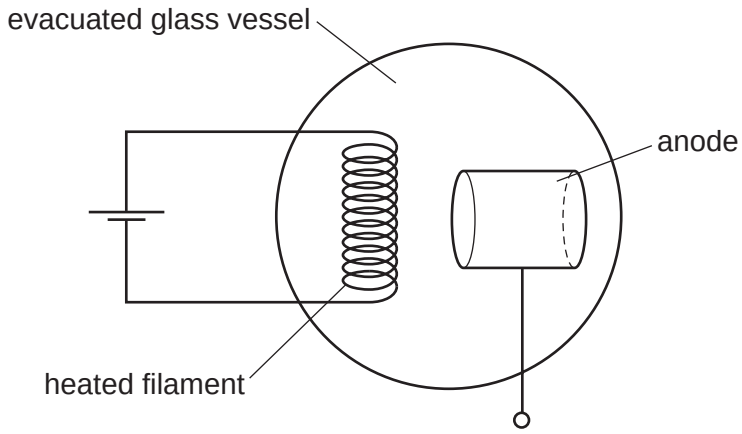



switches shown open (off)

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

| | $S_1$ | $S_2$ | voltmeter reading / V |
|---|---|---|---|
| **A** | open | open | 12 |
| **B** | closed | closed | 12 |
| **C** | open | closed | 0 |
| **D** | 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 |
|---|---|---|
| **A** | negative | to attract electrons |
| **B** | negative | to repel electrons |
| **C** | positive | to attract electrons |
| **D** | 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 2 g.

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 |
| | | | | | | | | | | | | | | | | 4 **He** Helium 2 |
| | | | | | 1 **H** Hydrogen 1 | | | | | | 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 | 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 |
| 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 † | | | | | | | | | | | | | | | | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | a = relative atomic mass |
| **X** | X = atomic symbol |
| b | b = proton (atomic) number |

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