



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/13

Paper 1 Multiple Choice

May/June 2012

45 minutes

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

* 5 1 2 8 3 2 6 4 6 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.

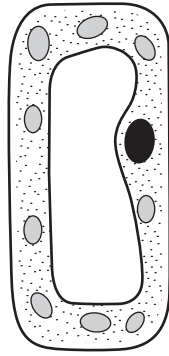
Any rough working should be done in this booklet.

A copy of the Periodic Table is printed on page 20.

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

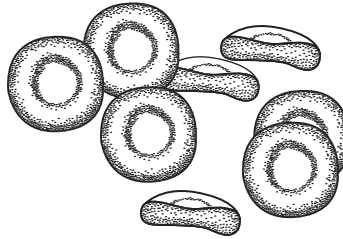


- 1 The diagram shows an incomplete plant cell.



Which structure is **not** shown?

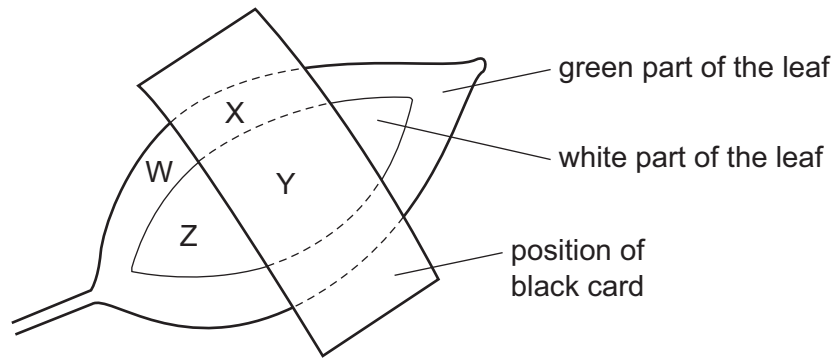
- A cell membrane
 - B cell wall
 - C chloroplast
 - D vacuole
- 2 The diagram shows some red blood cells.



What is the function of these cells?

- A antibody formation
- B carry oxygen
- C make glucose
- D phagocytosis

- 3 A plant has leaves which are green and white. One of the leaves is partly covered on both sides by a piece of black card. The plant is left under a lamp for two days.



The leaf is then removed from the plant and tested for starch (the carbohydrate made during photosynthesis).

Which row is correct?

| | W | X | Y | Z |
|----------|---|---|---|---|
| A | ✓ | ✓ | x | x |
| B | ✓ | x | x | x |
| C | x | ✓ | ✓ | x |
| D | x | x | ✓ | ✓ |

key

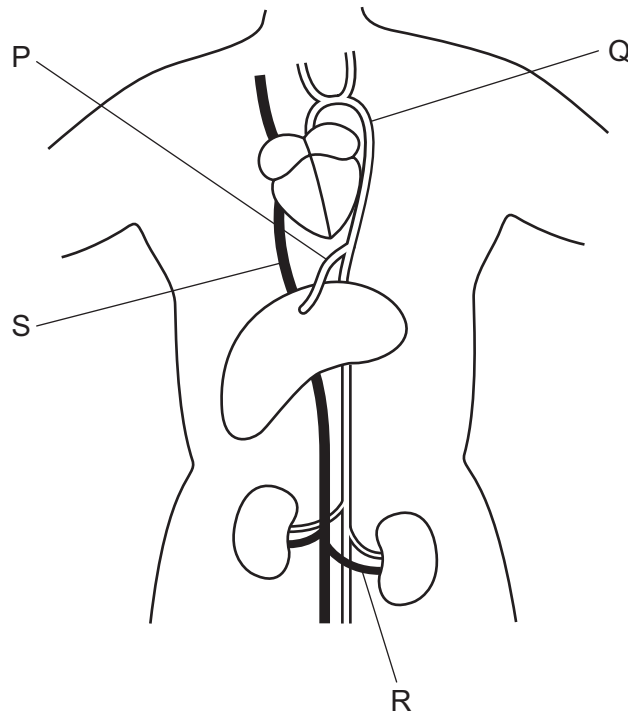
✓ = starch present

x = starch absent

- 4 Which word equation represents aerobic respiration?

- A** carbon dioxide + oxygen → glucose + water
B carbon dioxide + water → glucose + oxygen
C glucose + oxygen → carbon dioxide + water
D glucose + oxygen → lactic acid

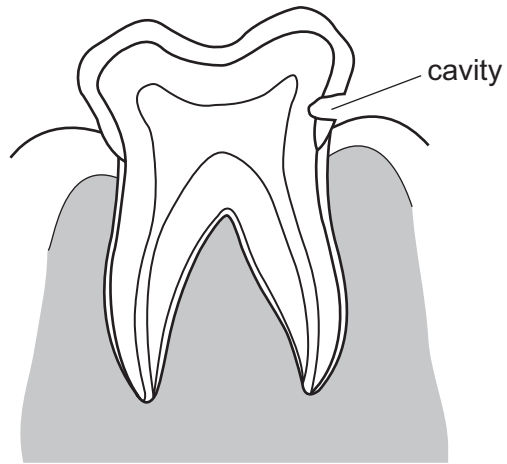
5 The diagram shows the heart, liver and kidneys with connecting blood vessels.



What are the labelled blood vessels?

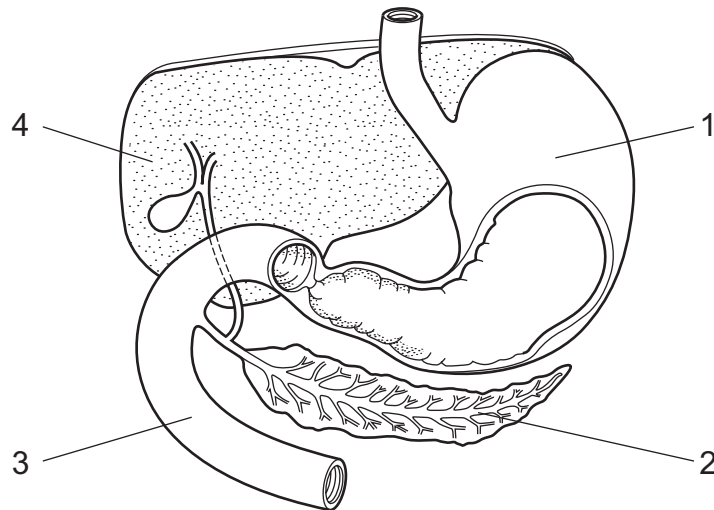
| | aorta | hepatic artery | vena cava | renal vein |
|----------|-------|----------------|-----------|------------|
| A | Q | P | S | R |
| B | Q | R | S | P |
| C | S | P | Q | R |
| D | S | R | Q | P |

- 6 The diagram shows a tooth with a cavity caused by decay.



Which part of the tooth has been exposed by the decay?

- A enamel
 - B dentine
 - C pulp
 - D root
- 7 The diagram shows part of the digestive system.



Which labels identify the liver, pancreas and stomach?

| | liver | pancreas | stomach |
|----------|-------|----------|---------|
| A | 2 | 1 | 3 |
| B | 2 | 3 | 1 |
| C | 4 | 2 | 3 |
| D | 4 | 2 | 1 |

- 8 A person touches a hot object which triggers a reflex action.

In which order does the signal travel in the reflex arc?

- A relay neurone → spinal cord → sensory neurone
- B sensory neurone → spinal cord → motor neurone
- C spinal cord → sensory neurone → stimulus
- D stimulus → motor neurone → spinal cord

- 9 Which organ in the body makes urea and how is urea removed from that organ?

| | where made | how removed |
|----------|------------|---------------------|
| A | kidneys | in urine |
| B | liver | in blood |
| C | liver | in bile |
| D | pancreas | in pancreatic juice |

- 10 Which structure produces seminal fluid?

- A prostate gland
- B sperm duct
- C testis
- D urethra

- 11 In plants, the allele for red flowers is dominant to the allele for white flowers.

A heterozygous red-flowered plant is crossed with a white-flowered plant.

What percentage of the offspring will have red flowers?

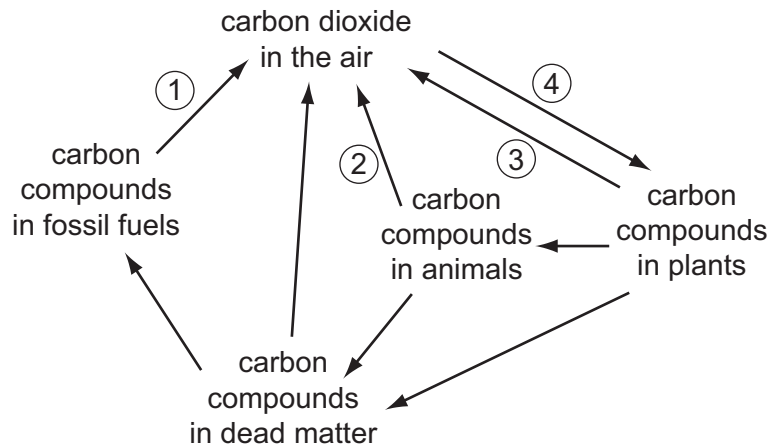
- A 25%
- B 50%
- C 75%
- D 100%

- 12 The diagram shows a food chain.

Which organisms pass the greatest amount of energy along the food chain?



13 The diagram shows part of the carbon cycle.

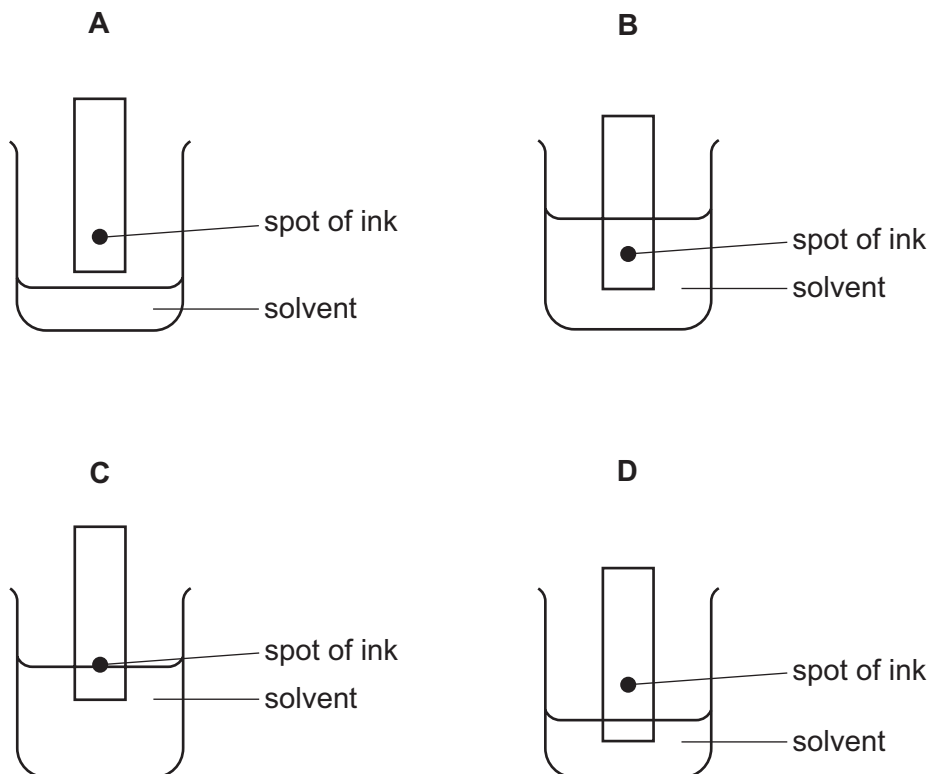


Where are photosynthesis and respiration happening?

| | photosynthesis | respiration |
|----------|----------------|-------------|
| A | 3 | 2 |
| B | 3 | 4 |
| C | 4 | 1 |
| D | 4 | 3 |

14 The colours in an ink can be separated by chromatography.

Which diagram shows the correct way to set up the apparatus?



15 The symbol for an atom of neon is ${}_{10}^{20}\text{Ne}$.

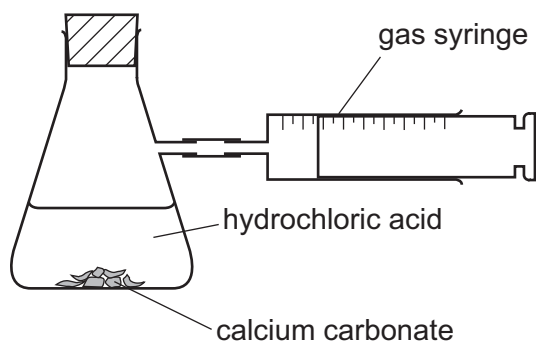
Which statement about the atom is correct?

- A It contains half as many neutrons as protons.
- B It contains twice as many neutrons as protons.
- C The number of neutrons equals the number of protons.
- D The total number of neutrons and protons is thirty.

16 Which formula contains the most elements?

- A NaOH B Rb_2S C SiCl_4 D SnO_2

17 The apparatus shown is used to investigate the speed of reaction between hydrochloric acid and calcium carbonate.



The time to collect 50 cm^3 of gas is measured.

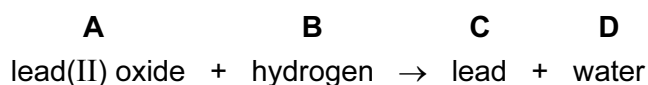
Using concentrated acid and lumps of calcium carbonate, the time is 150 s.

In a second experiment, the time is 90 s.

Which change was made in the second experiment?

- A larger lumps of calcium carbonate
- B less concentrated acid
- C lower temperature
- D powdered calcium carbonate

18 Which substance is reduced during the following reaction?

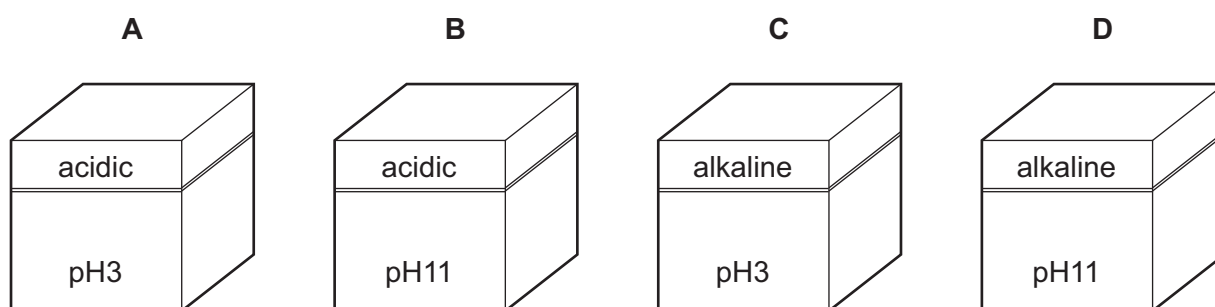


19 A coloured solution of compound X gives a white precipitate with acidified silver nitrate.

What is X?

- A calcium chloride
- B calcium sulfate
- C copper(II) chloride
- D copper(II) sulfate

20 Which box contains a solution of a metal oxide?



21 The table shows physical properties of some substances.

Which substance is a metal?

| | malleability | density | electrical conductivity |
|----------|--------------|--------------|-------------------------|
| A | brittle | high density | high |
| B | brittle | low density | low |
| C | malleable | high density | high |
| D | malleable | low density | low |

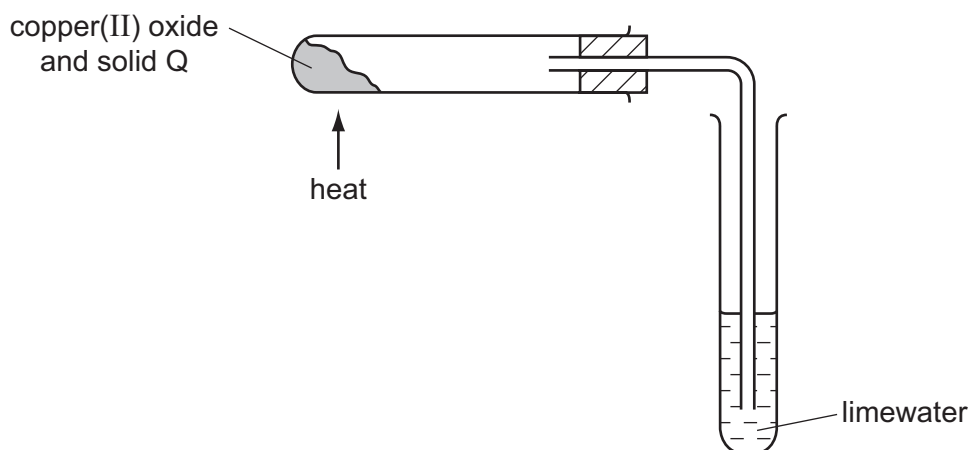
22 The diagram shows part of the Periodic Table.

Which letter shows the position of a metal with a low melting point?



23 Copper(II) oxide is mixed with a solid Q.

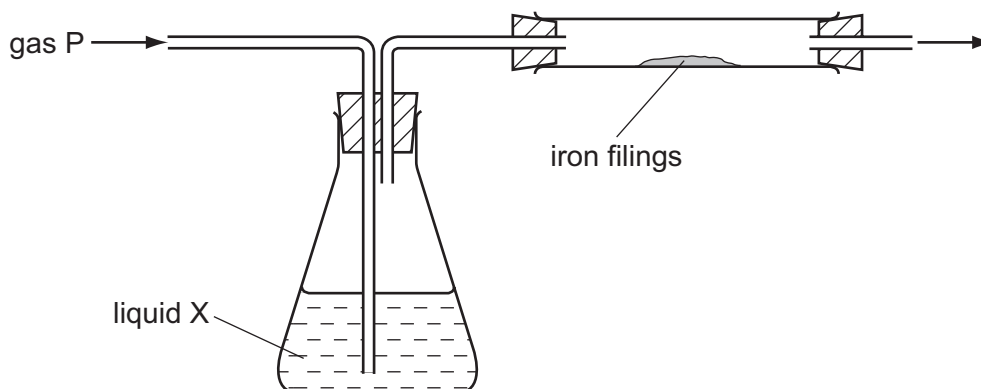
On heating the mixture, a reaction occurs and the limewater turns milky.



What is solid Q?

- A carbon
- B iron
- C sulfur
- D zinc

24 The diagram shows gas P being passed through liquid X and then over iron filings.



Which gas and liquid cause the iron to rust?

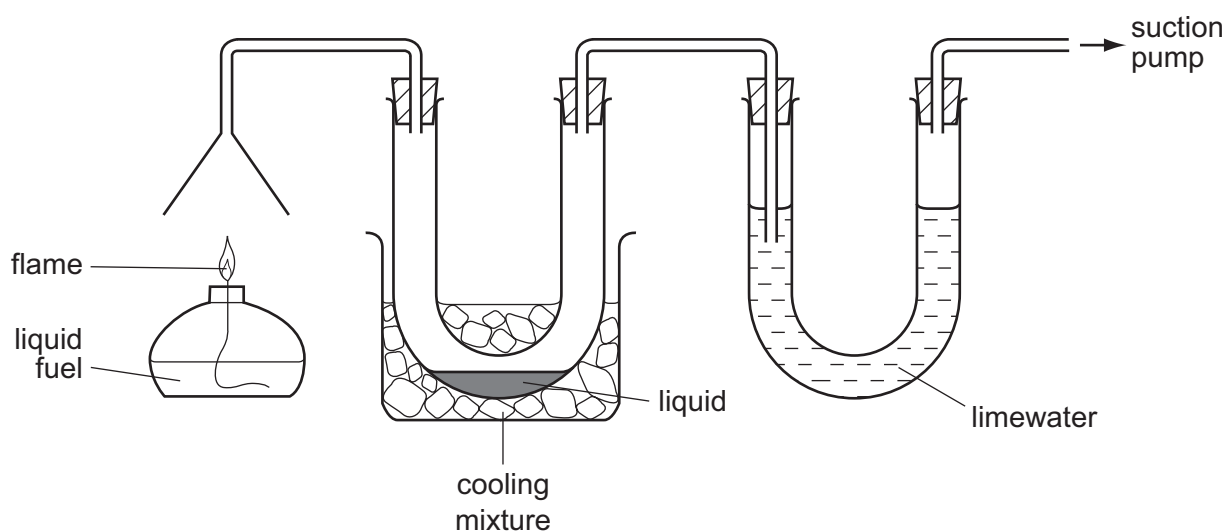
| | gas P | liquid X |
|---|----------|---|
| A | nitrogen | concentrated sulfuric acid (a drying agent) |
| B | nitrogen | water |
| C | oxygen | concentrated sulfuric acid (a drying agent) |
| D | oxygen | water |

25 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 KNO_3
- D $(\text{NH}_4)_2\text{SO}_4$

26 The burning of a fuel is investigated using the apparatus shown.



Which substances is the apparatus testing for?

- A carbon monoxide and carbon dioxide
- B carbon monoxide and water
- C carbon dioxide and water
- D carbon dioxide and sulfur dioxide

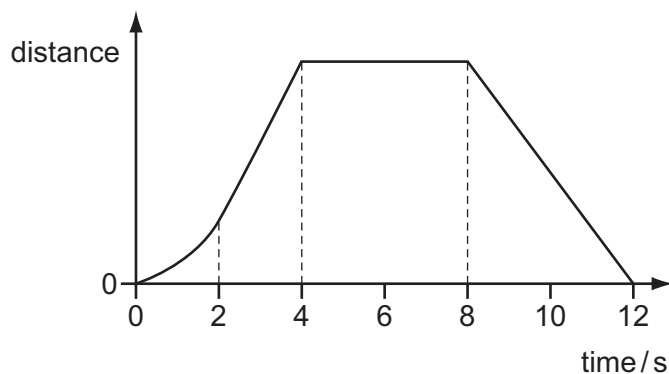
27 This description of a plastic is incomplete.

To make a plastic,1..... of a2..... combine to form a long chain3..... .

Which words correctly complete the gaps?

| | 1 | 2 | 3 |
|---|-----------|---------|---------|
| A | atoms | monomer | polymer |
| B | atoms | polymer | monomer |
| C | molecules | monomer | polymer |
| D | molecules | polymer | monomer |

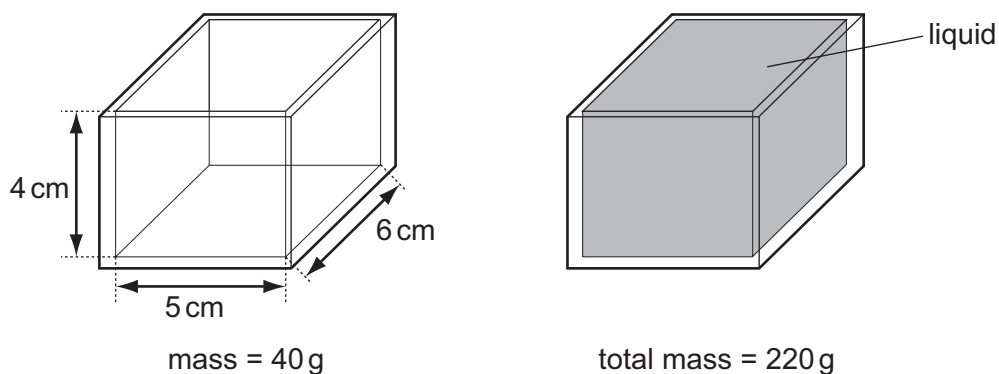
28 The graph shows how the distance of an object changes with time.



Between which two times is the object moving with a changing speed?

- A between 0 s and 2 s
- B between 2 s and 4 s
- C between 4 s and 8 s
- D between 8 s and 12 s

29 The diagrams show a glass tank with inside measurements of 5 cm × 6 cm × 4 cm.



The tank has a mass of 40 g when empty. When the tank is filled with a liquid, the tank and liquid have a total mass of 220 g.

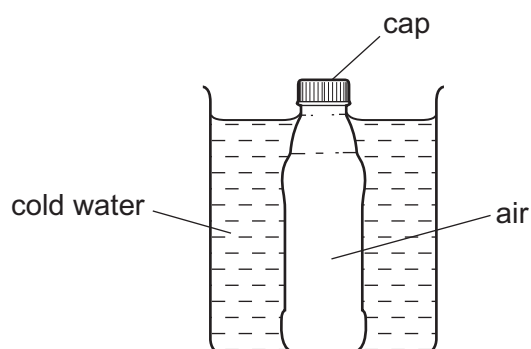
What is the density of the liquid?

- A $\frac{220}{(5 \times 6 \times 4)} \text{ g/cm}^3$
- B $\frac{(220 - 40)}{(5 \times 6 \times 4)} \text{ g/cm}^3$
- C $\frac{(5 \times 6 \times 4)}{220} \text{ g/cm}^3$
- D $\frac{(5 \times 6 \times 4)}{(220 - 40)} \text{ g/cm}^3$

30 Which energy resource did **not** receive its energy from the Sun?

- A geothermal
- B hydroelectric
- C oil
- D waves

31 A glass bottle containing air is sealed with a screw cap and then cooled in cold water.



The contraction of the glass bottle can be ignored.

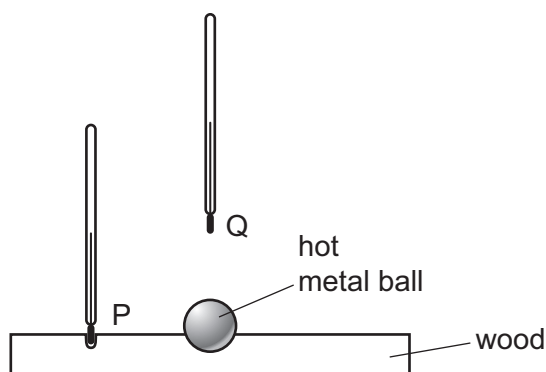
What remains the same during the cooling?

- A the air pressure inside the bottle
- B the energy of the air molecules in the bottle
- C the force on the cap made by the air molecules in the bottle
- D the volume of air inside the bottle

32 What happens to the temperature of a substance as it is melting and as it is boiling?

| | melting | boiling |
|----------|-----------|-----------|
| A | decreases | increases |
| B | decreases | no change |
| C | increases | increases |
| D | no change | no change |

- 33 A hot metal ball is placed in a small hollow in a piece of wood. Two thermometers are placed equal distances from the ball, one at position P and one at position Q.

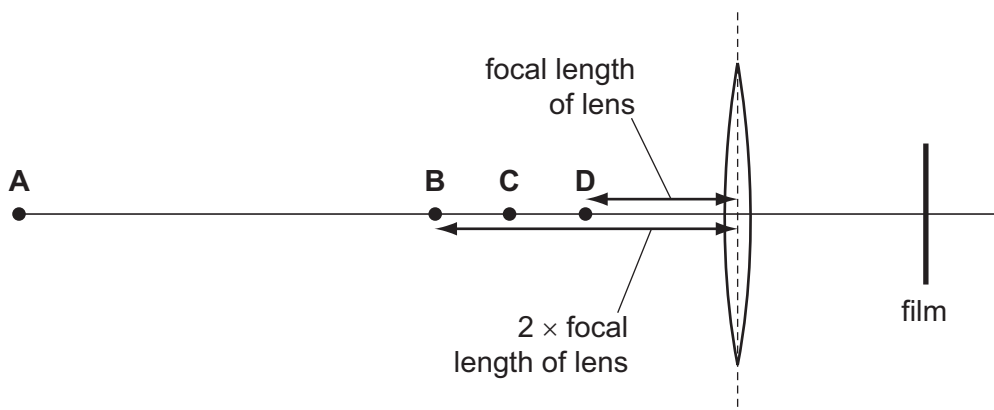


Which thermometer gives the highest reading and why?

| | highest reading | reason |
|----------|------------------|--|
| A | thermometer at P | the air conducts heat sideways, not upwards |
| B | thermometer at P | the wood conducts the heat sideways, not upwards |
| C | thermometer at Q | convection carries the heat upwards, not sideways |
| D | thermometer at Q | infra-red rays carry the heat upwards more than sideways |

- 34 A converging lens in a camera is used to make an image on a film. The image is smaller than the object.

At which point could the object be placed so that it makes this image?

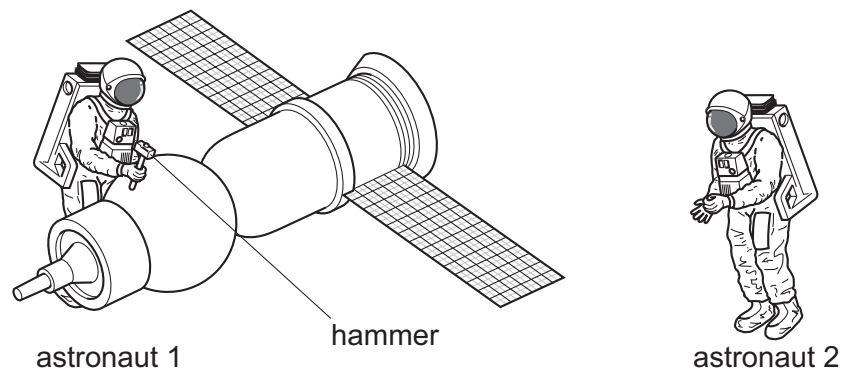


- 35 The Sun emits infra-red radiation, ultraviolet radiation and visible light.

Which statement about the time it takes these radiations to reach Earth's atmosphere is correct?

- A** Infra-red radiation arrives first.
- B** Ultraviolet radiation arrives first.
- C** Visible light arrives first.
- D** They all arrive at the same time.

- 36 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no air in space.



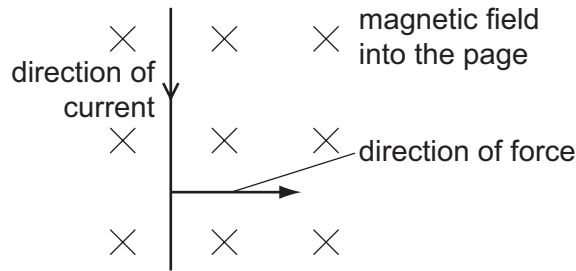
Compared with the sound heard if they were working on Earth, what does astronaut 2 hear?

- A a louder sound
 - B a quieter sound
 - C a sound of the same loudness
 - D no sound at all
- 37 The instructions for a household lamp state that the plug should be fitted with a 3 A fuse.

What could happen if, by mistake, a 13 A fuse is fitted?

- A The fuse might melt too easily.
- B The lamp might explode if a fault develops.
- C The wires connecting the lamp to the plug might overheat if a fault developed.
- D Too much voltage might be supplied to the lamp.

- 38 An electric current flows along a wire. A magnetic field is at right angles to it (into the page). This causes a force on the wire to the right.

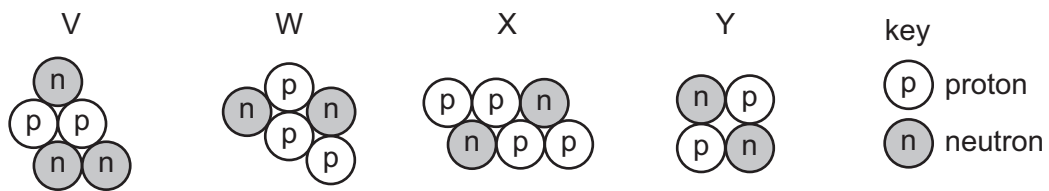


In which direction is the force when the current direction is reversed?

- A to the right
 - B to the left
 - C upwards
 - D downwards
- 39 Which row describes the nature of alpha and beta radiation?

| | alpha | beta |
|---|----------------|----------------------|
| A | electron | electromagnetic wave |
| B | electron | helium nucleus |
| C | helium nucleus | electromagnetic wave |
| D | helium nucleus | electron |

- 40 The diagrams represent the nuclei of four different atoms V, W, X and Y.



Which two diagrams represent isotopes of the same element?

- A V and W
- B W and X
- C X and Y
- D Y and V

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| I | II | III | IV | V | VI | VII | 0 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | 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 | 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 | 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 | 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 | 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 | 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 U Uranium 92 | 238 Pa Protactinium 91 | 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 | X | † |

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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