UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

**COMBINED SCIENCE** **0653/01**

Paper 1 Multiple Choice **October/November 2008**

**45 minutes**

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

*0693052096*

**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.

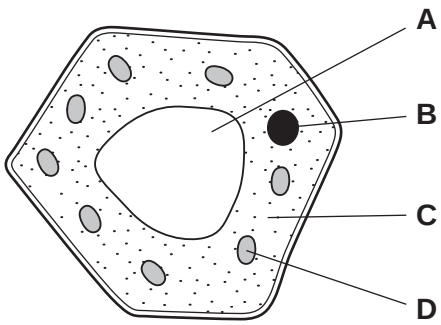
**Read the instructions on the Answer Sheet very carefully.**

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.

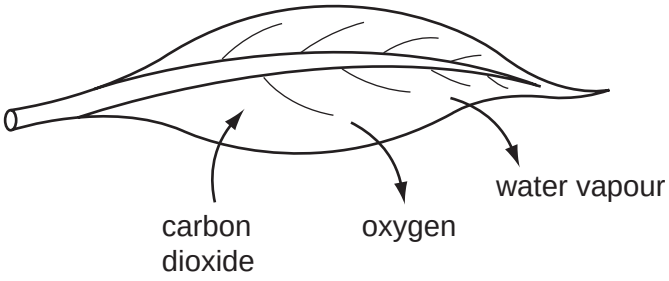
This document consists of **18** printed pages and **2** blank pages.

**1** The diagram shows a mesophyll cell from a green plant.

Where is the cell's DNA found?




**2** The diagram shows a leaf in sunlight and some of the substances that diffuse into and out of it.




Which of the following has a higher concentration outside the leaf than inside the leaf?

**A** carbon dioxide only

**B** carbon dioxide and oxygen

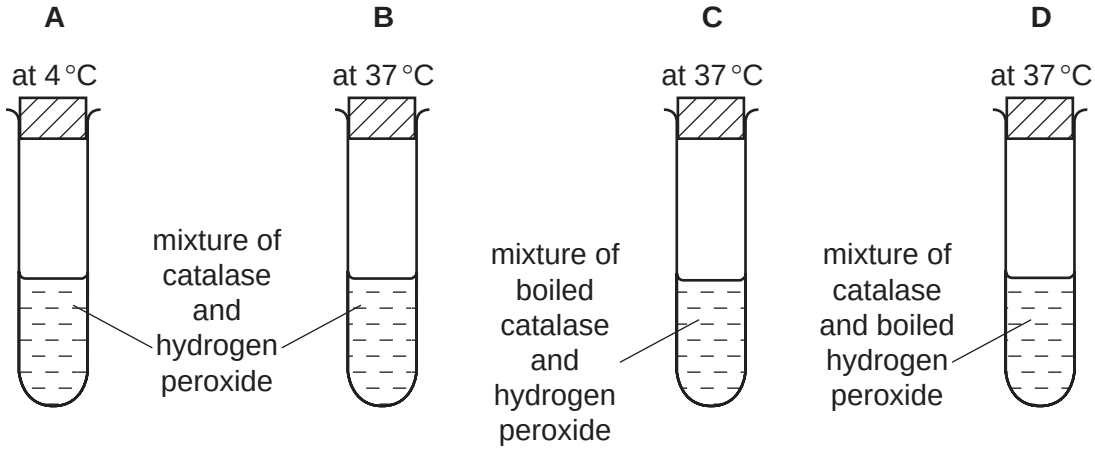
**C** oxygen and water

**D** water vapour only

**3** The diagrams show an experiment on enzyme activity.

The test-tubes contain equal volumes of solutions of catalase and hydrogen peroxide.

In which test-tube does the enzyme fail to work because it has been denatured?



**4** In which way do plants usually take in water from their surroundings?

**A** as liquid through stomata

**B** as liquid through root hairs

**C** as vapour through stomata

**D** as vapour through root hairs

**5** A series of tests on a white liquid gave the following results.

| test | result of test |
|---|---|
| Benedict's | an orange-red colour |
| biuret | a pale blue colour |
| iodine | a blue-black colour |

What did the white liquid contain?

**A** protein and starch only

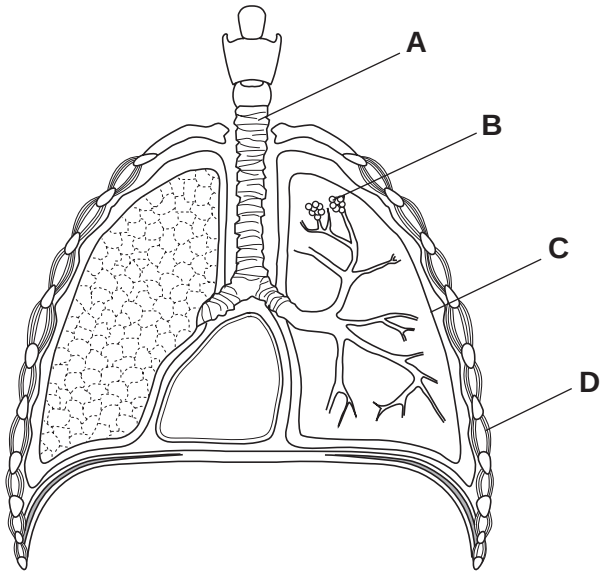
**B** protein and reducing sugar only

**C** protein, reducing sugar and starch

**D** reducing sugar and starch only

**6** The diagram shows the thorax.

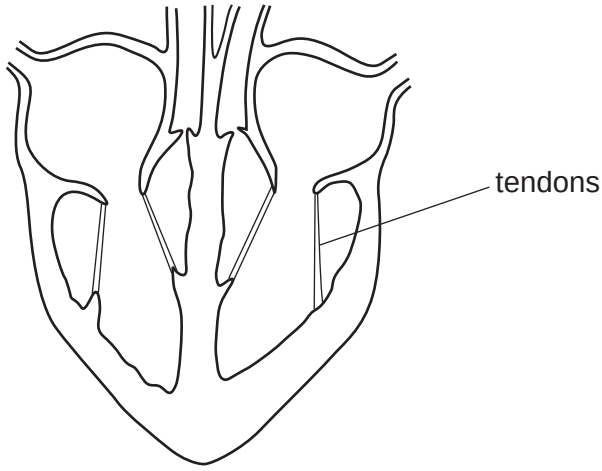
Which part has a lining containing goblet cells?






[Turn over

**7** The diagram shows a section through the human heart.




Which structures are joined by the tendons?

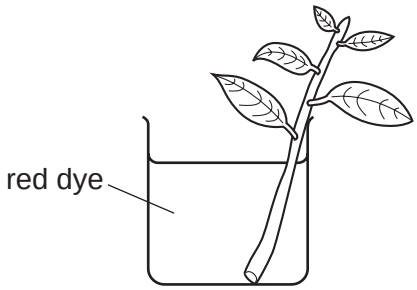
**A** atrium wall and septum

**B** atrium wall and valve

**C** septum and ventricle wall

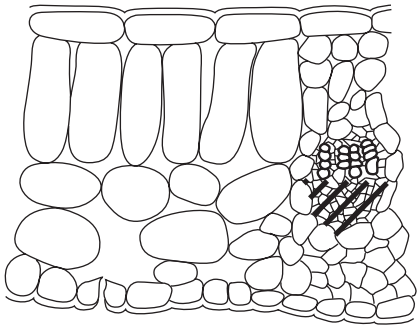
**D** valve and ventricle wall

**8** A plant shoot is left for several hours in a solution of red dye.

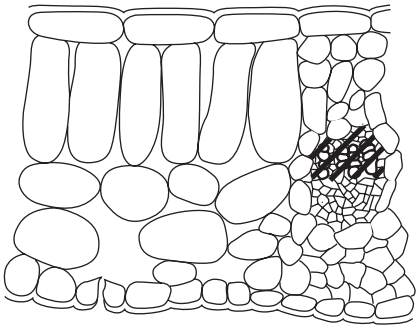



What is seen when a section is cut through a leaf and observed under a microscope?

**A**



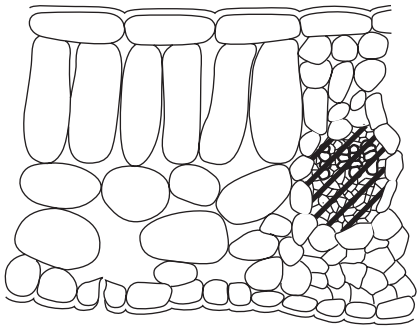
**B**



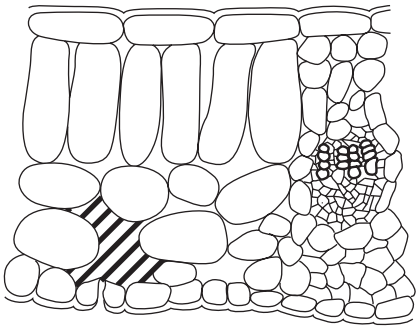
key

red area

**C**



**D**



**9** Which sequence shows the path of a signal through the nervous system when a person touches a hot object?

**A** central nervous system → effector → receptor

**B** effector → central nervous system → receptor

**C** effector → receptor → central nervous system

**D** receptor → central nervous system → effector

**10** Which event that happens in the ovary of a flower starts seed formation?

**A** conservation

**B** fertilisation

**C** germination

**D** pollination

**11** Which is **not** responsible for variation in characteristics in a plant?

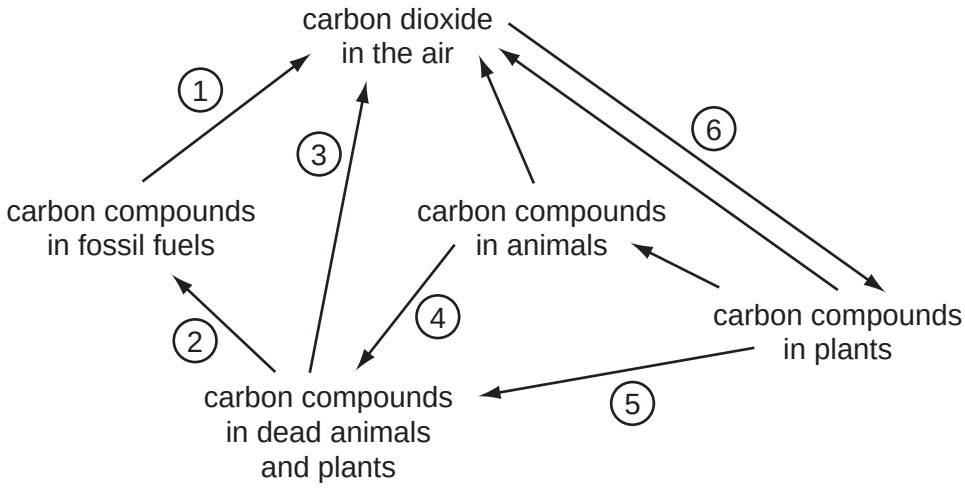
**A** chromosomes

**B** cloning

**C** environment

**D** genes

**12** The diagram shows part of the carbon cycle.




During which stage in the cycle will oxygen be added to the air?

**A** 1 **B** 3 **C** 5 **D** 6

**13** Which are possible harmful effects of deforestation?

| | global warming | reduced species diversity | soil erosion |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✓ | ✗ | ✗ |
| **D** | ✗ | ✓ | ✓ |

key
✓ = yes
✗ = no

**14** The symbol for an atom of neon is $^{20}_{10}Ne$ .

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.

**15** On heating iron and sulphur together, the mixture starts to glow. The glow then continues even when the heating is stopped.

In this reaction, ……1…… heat is given out and a new ……2…… is formed.

Which words correctly complete gaps 1 and 2?

| | 1 | 2 |
|---|---|---|
| **A** | no | element |
| **B** | no | compound |
| **C** | some | element |
| **D** | some | compound |

**16** Which gases have covalent molecules that contain one or more double bonds?

| | carbon dioxide | ethene | hydrogen chloride |
|---|---|---|---|
| **A** | ✓ | ✓ | ✓ |
| **B** | ✓ | ✓ | ✗ |
| **C** | ✗ | ✓ | ✓ |
| **D** | ✗ | ✗ | ✓ |

**17** What does a word equation show?

| | the changes that occur in a reaction | the speed of a reaction |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**18** Which formula contains the most elements?

**A** NaOH **B** $Rb_2S$ **C** $SiCl_4$ **D** $SnO_2$

**19** Urea, $(NH_2)_2CO$, is used as a fertiliser.

How many atoms or molecules are combined in urea?

**A** atoms: nitrogen, 1; hydrogen, 2; carbon, 2; oxygen, 2

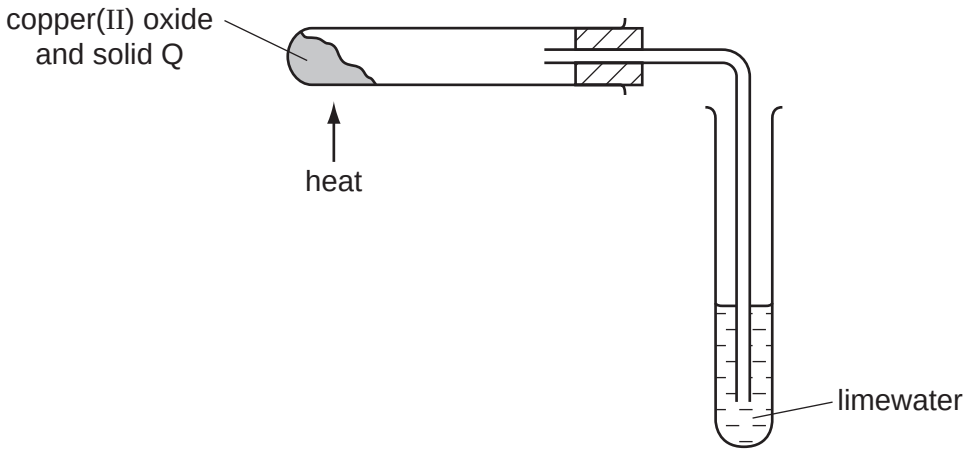
**B** atoms: nitrogen, 2; hydrogen, 4; carbon, 1; oxygen, 1

**C** molecules: ammonia, 1; carbon monoxide, 2

**D** molecules: ammonia, 2; carbon monoxide, 1

**20** Copper(II) oxide is mixed with solid Q.

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




What is solid Q?

**A** carbon

**B** iron

**C** sulphur

**D** zinc

**21** What is an alloy?

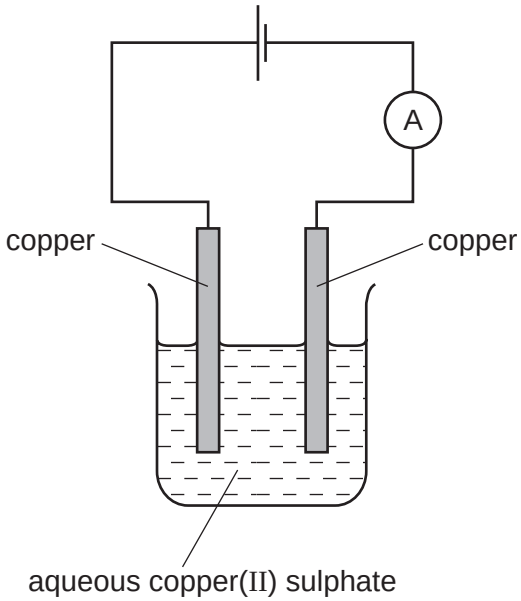
**A** a compound containing two metallic elements

**B** a compound containing two non-metallic elements

**C** a mixture containing two metallic elements

**D** a mixture containing two non-metallic elements

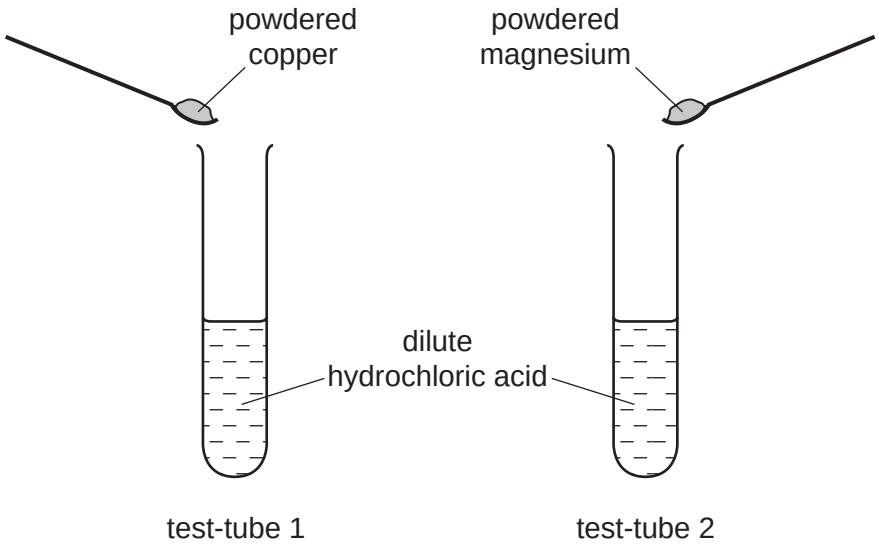
**22** Impure copper is purified by electrolysis, as shown.




What is the cathode made of and how does its mass change during the electrolysis?

| | the cathode is made of | its mass |
|---|---|---|
| **A** | impure copper | decreases |
| **B** | impure copper | increases |
| **C** | pure copper | decreases |
| **D** | pure copper | increases |

**23** The diagrams show an experiment.




Each element is added until there is no further reaction. Universal Indicator solution is then added to each test-tube.

What are the colours of the indicator in the two test-tubes?

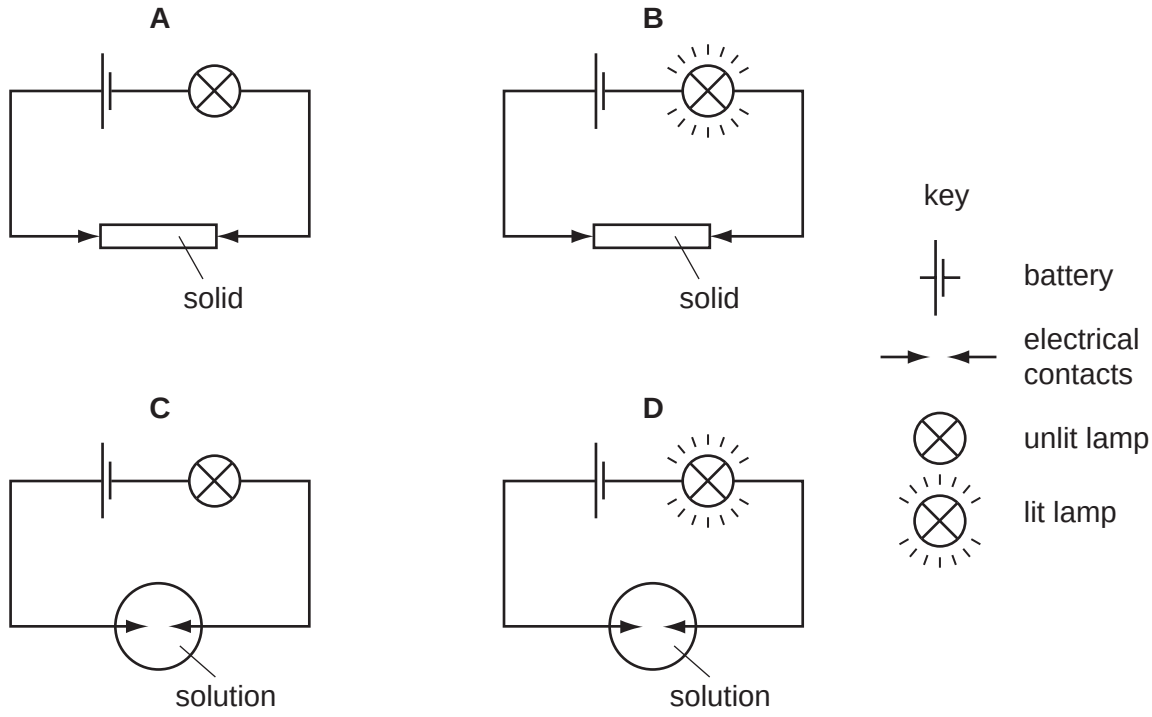
| | test-tube 1 | test-tube 2 |
|---|---|---|
| **A** | blue | green |
| **B** | blue | red |
| **C** | red | green |
| **D** | red | red |

**24** When a mixture of hydrogen and oxygen is ignited, an explosive reaction occurs and water is formed.

Which terms describe this reaction?

| | combustion | redox |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

**25** Which diagram shows that an electrolyte is present?




**26** Which energy sources burn fossil fuels?

1 a coal-fired power station

2 a nuclear power station

3 an oil-fired power station

**A** 1 and 2 only

**B** 1 and 3 only

**C** 2 and 3 only

**D** 1, 2 and 3

**27** Some plastics have long chain molecules that are made from molecules called X.

The molecules of X are most commonly obtained from Y.

What are X and Y?

| | X | Y |
|---|---|---|
| **A** | monomers | coal |
| **B** | monomers | oil |
| **C** | polymers | coal |
| **D** | polymers | oil |

**28** Two digital stopwatches X and Y, which record in minutes and seconds, are used to time a race.

The readings of the two stopwatches, at the start and at the end of the race, are shown.

| | start | end |
|---|---|---|
| X | 00:00 | 00:40 |

| | start | end |
|---|---|---|
| Y | 01:30 | 02:20 |

Which statement about the time of the race is correct?

**A** Both stopwatches recorded the same time interval.

**B** Stopwatch X recorded 10 s longer than stopwatch Y.

**C** Stopwatch Y recorded 10 s longer than stopwatch X.

**D** Stopwatch Y recorded 50 s longer than stopwatch X.

**29** A car travels at various speeds during a short journey.

The table shows the distances travelled and the time taken during each of four stages P, Q, R and S.

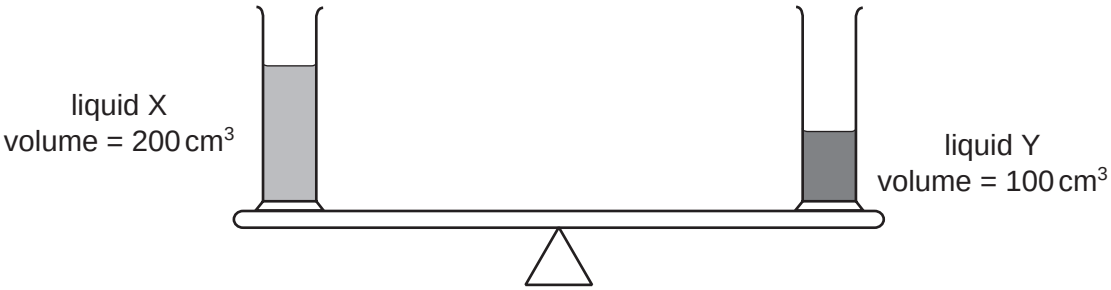
| stage | P | Q | R | S |
|---|---|---|---|---|
| distance travelled / km | 1.8 | 3.6 | 2.7 | 2.7 |
| time taken / minutes | 2 | 2 | 4 | 3 |

During which two stages is the car travelling at the same speed?

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

**30** Two identical measuring cylinders containing different liquids are placed on a simple balance.

They balance as shown.




How does the density of X compare with the density of Y?

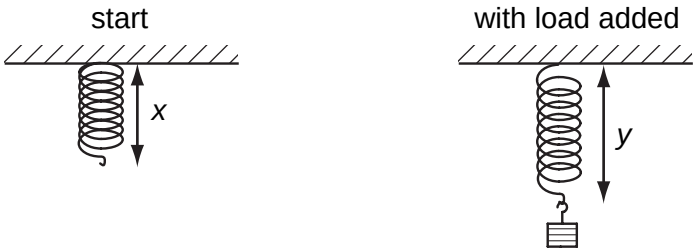
**A** density of X = $\frac{1}{2}$ × density of Y

**B** density of X = density of Y

**C** density of X = 2 × density of Y

**D** density of X = 4 × density of Y

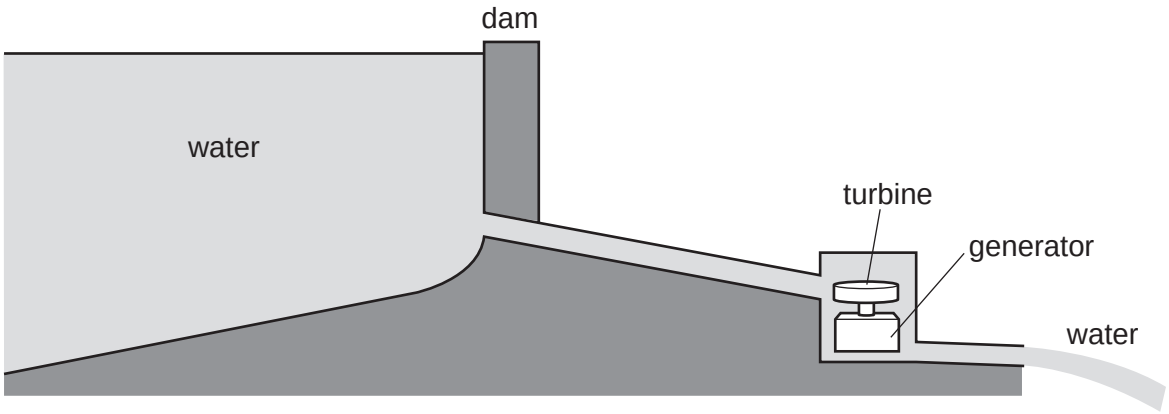
**31** A student carries out an experiment to plot the extension-load graph for a spring. The diagrams show the apparatus at the start of the experiment and with a load added.




What is the extension caused by the load?

**A** $x$ **B** $y$ **C** $y + x$ **D** $y - x$

**32** The diagram shows water stored behind a dam.




The water flows to a turbine and turns a generator.

Which sequence for the conversion of energy is correct?

**A** potential energy → kinetic energy → electrical energy

**B** kinetic energy → potential energy → electrical energy

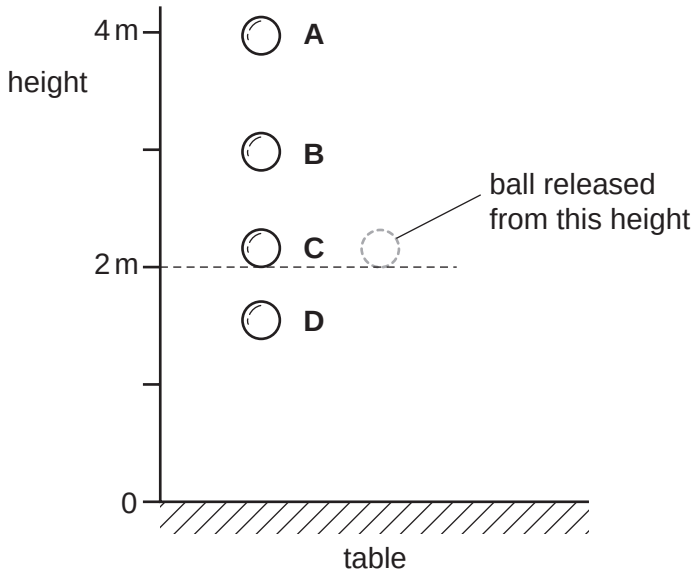
**C** potential energy → electrical energy → kinetic energy

**D** kinetic energy → electrical energy → potential energy

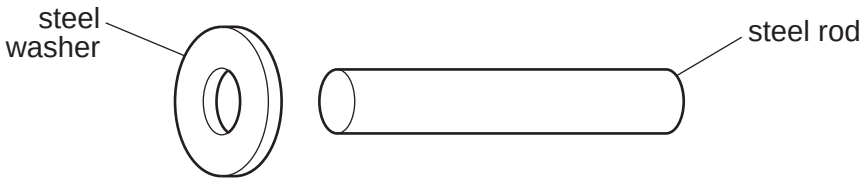
**33** A rubber ball is dropped from a height of 2 metres onto a table.

Whilst in contact with the table, some of its energy is converted into heat energy.

What is the highest possible point the ball could reach after bouncing?



**34** An engineer wants to fix a steel washer onto a steel rod. The rod is just too big to fit into the hole of the washer.




How can the engineer fit the washer onto the rod?

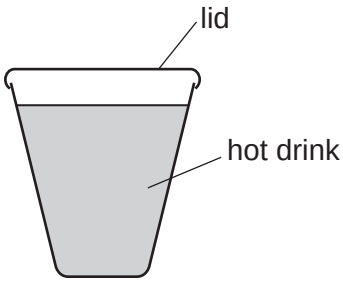
**A** Cool the washer and put it over the rod.

**B** Cool the washer and rod to the same temperature and push them together.

**C** Heat the rod and then place it in the hole.

**D** Heat the washer and then place it over the rod.

**35** A white plastic lid is placed on a plastic cup used for a hot drink.




This would have no effect on the loss of heat by

**A** conduction.

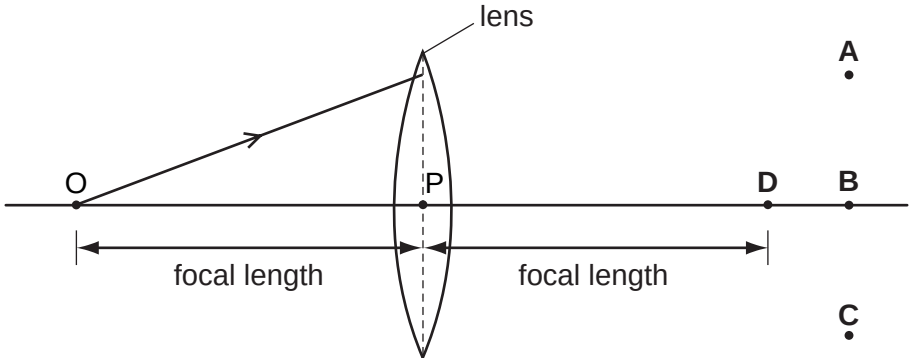
**B** convection.

**C** evaporation.

**D** radiation.

**36** In the diagram, the distance OP is the focal length of the lens.

Through which point will the ray shown pass, after refraction by the lens?

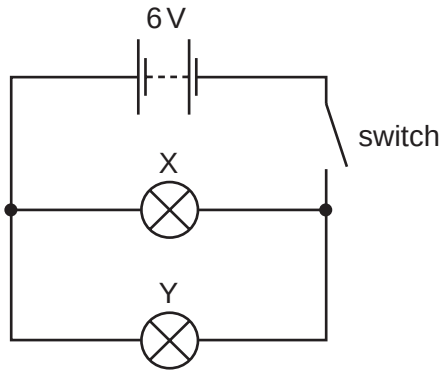


**37** The table shows the voltage and current ratings for four electric heaters.

Which heater has the least resistance?

| | voltage / V | current / A |
|---|---|---|
| **A** | 110 | 5.0 |
| **B** | 110 | 10.0 |
| **C** | 230 | 5.0 |
| **D** | 230 | 10.0 |

**38** In the circuit below, X and Y are identical 6 V lamps.




What happens when the switch is closed (switched on)?

**A** X lights more brightly than Y.

**B** Y lights more brightly than X.

**C** X and Y both light with full brightness.

**D** X and Y both light with half brightness.

**39** Two different systems are used to transmit equal amounts of electrical power from one building to another.

One system uses low voltage and the other uses high voltage.

Which line in the table is correct about which system wastes least energy and why?

| | least energy wasted | why |
|---|---|---|
| **A** | high voltage system | the current in the wires is bigger |
| **B** | high voltage system | the current in the wires is smaller |
| **C** | low voltage system | the current in the wires is bigger |
| **D** | low voltage system | the current in the wires is smaller |

**40** Which type of radiation can be stopped by a sheet of paper?

**A** alpha-particles

**B** beta-particles

**C** gamma-rays

**D** X-rays

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**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 Sulphur 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.).