



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/12

Paper 1 Multiple Choice

May/June 2014

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, 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.
DO NOT WRITE IN ANY BARCODES.

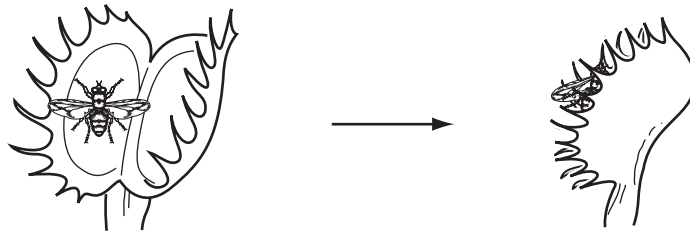
There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A, B, C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

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.
Electronic calculators may be used.

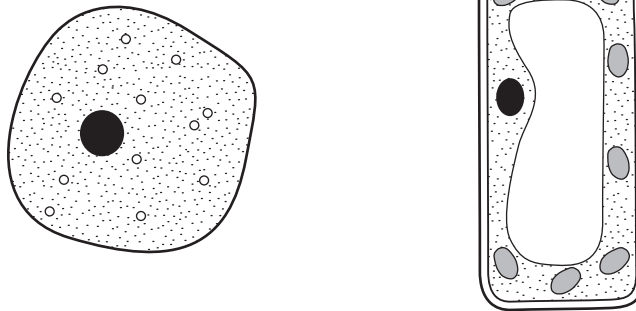
This document consists of **17** printed pages and **3** blank pages.

- 1 The Venus fly trap is a plant that catches insects.



Which characteristic is shown in the diagram?

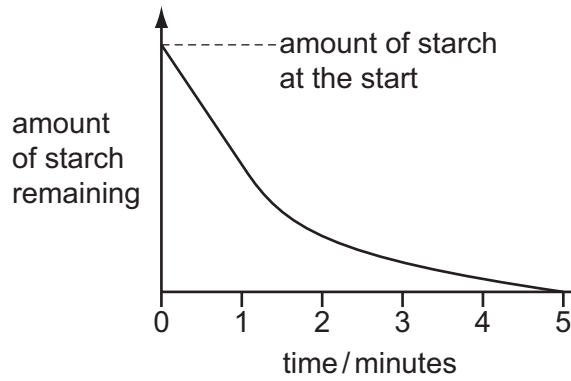
- A excretion
 - B growth
 - C reproduction
 - D sensitivity
- 2 The diagram shows two different cells.



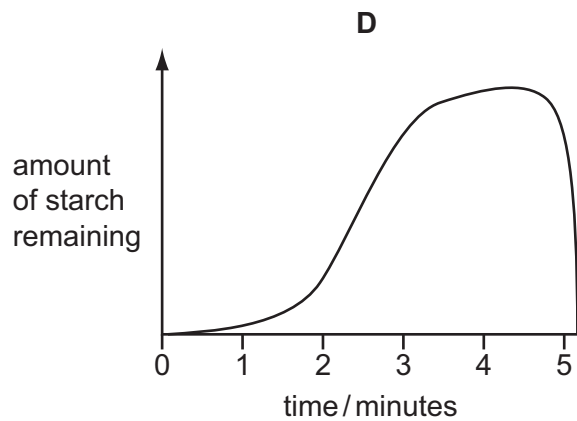
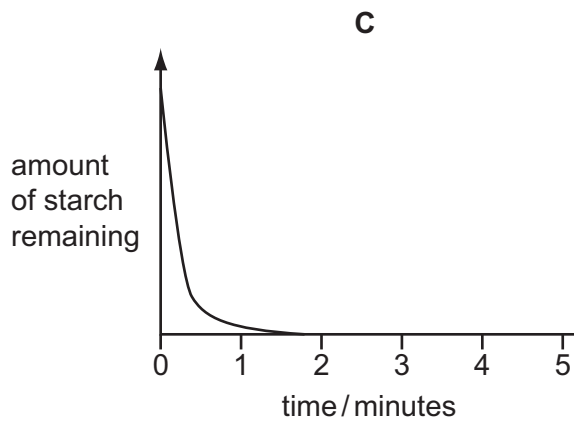
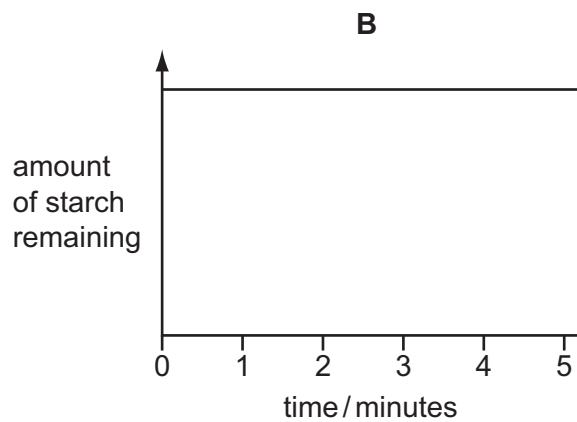
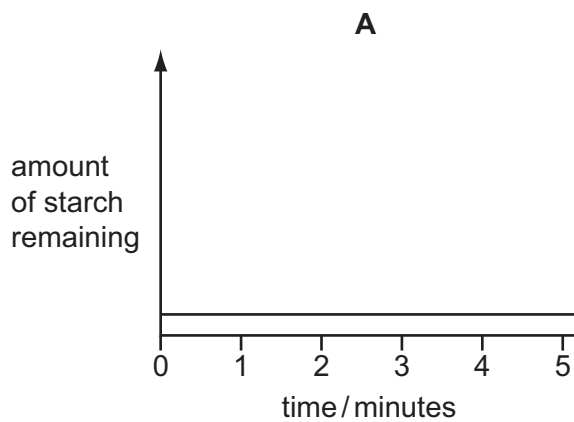
Which feature do they both have?

- A cell membrane
 - B cell wall
 - C central vacuole
 - D chloroplasts
- 3 How does oxygen pass from the alveoli to the blood capillaries in the lungs?
- A diffusion
 - B evaporation
 - C secretion
 - D transpiration

- 4 A test-tube containing a starch-amylose mixture is incubated at 35 °C. The graph shows how the amount of starch in the test-tube changes over the next five minutes.



Which graph shows what happens if a similar starch-amylose mixture is incubated at 100 °C?



5 Which row states the basic units from which the large molecules are made?

| | large molecules | basic units |
|----------|-----------------|---------------|
| A | oil | amino acids |
| B | oil | simple sugars |
| C | protein | amino acids |
| D | protein | simple sugars |

6 During photosynthesis, where does most of the carbon dioxide and water enter a leaf?

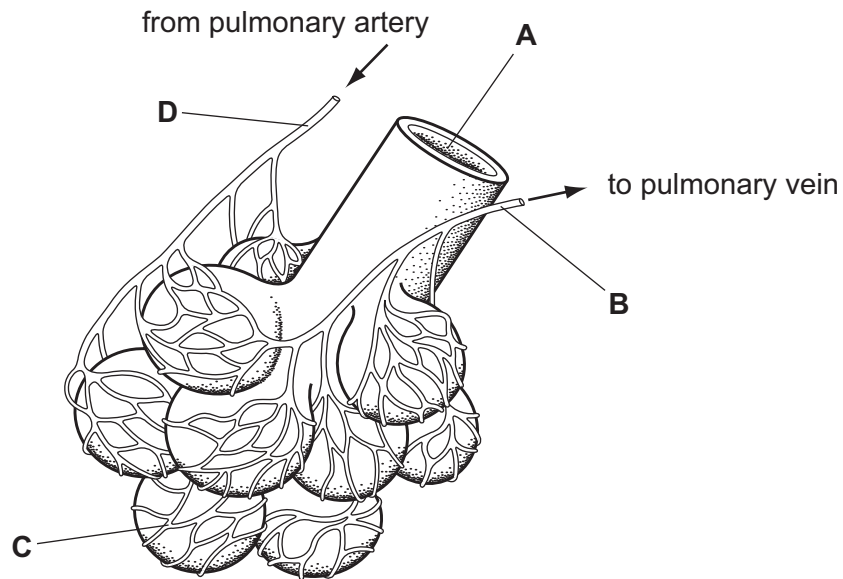
| | carbon dioxide | water |
|----------|-----------------|-----------|
| A | through cuticle | in phloem |
| B | through cuticle | in xylem |
| C | through stomata | in phloem |
| D | through stomata | in xylem |

7 Which processes require energy released from respiration?

| | cell division | diffusion into a cell | protein synthesis |
|----------|---------------|-----------------------|-------------------|
| A | ✓ | ✓ | ✓ |
| B | ✓ | ✓ | ✗ |
| C | ✓ | ✗ | ✓ |
| D | ✗ | ✓ | ✓ |

- 8 The diagram shows some of the structures in a human lung.

Where is the oxygen concentration lowest?

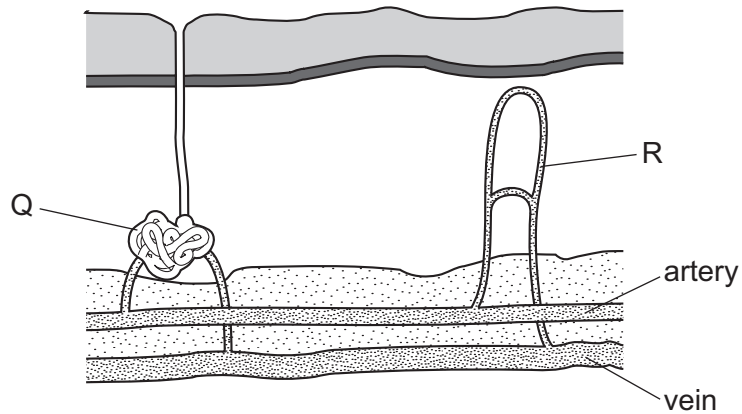


- 9 You suddenly pull your finger away if you accidentally touch something hot.

Which process controls this sudden response?

- A a muscular movement by the spinal cord
- B a nervous reflex, not directed by the brain
- C reflex muscle action independent of any nervous or brain control
- D your brain, without you thinking about it

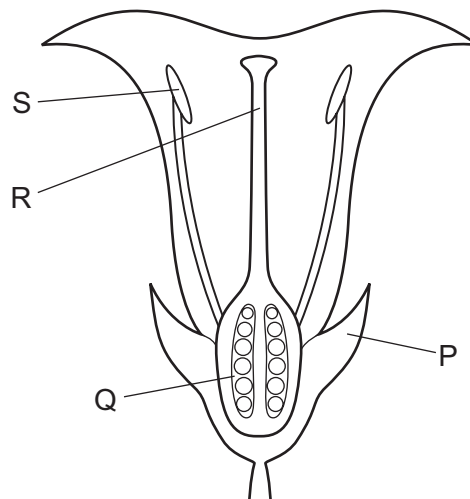
10 The diagram shows a section through human skin.



What happens at Q and R if a person becomes hot?

| | Q | R |
|----------|-------------------------|----------------------|
| A | evaporation takes place | increased blood flow |
| B | sweat collects | reduced blood flow |
| C | sweat is released | reduced blood flow |
| D | sweat is secreted | increased blood flow |

11 The diagram shows a section through a flower.



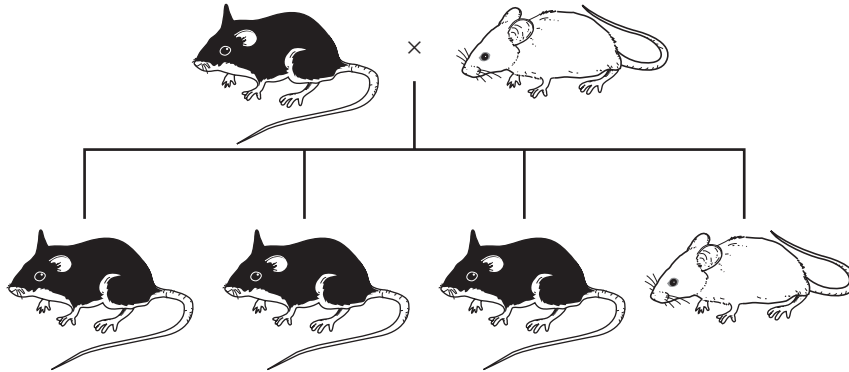
Which labelled structures are the anther and the ovary?

| | anther | ovary |
|----------|--------|-------|
| A | R | P |
| B | R | Q |
| C | S | P |
| D | S | Q |

12 What does a human male inherit from his father?

- A an X allele
- B an X sperm
- C a Y chromosome
- D a Y gene

13 The diagram shows the results of mating a male mouse that has black fur with a female mouse that has white fur.

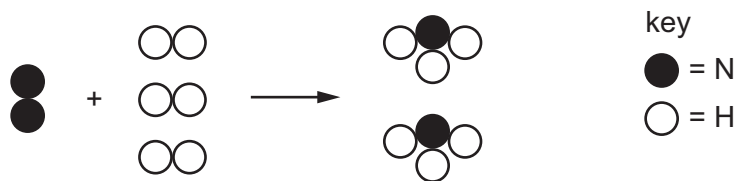


If the allele for black fur is dominant, what do the results show?

- A The female parent is heterozygous.
 - B The male parent is heterozygous.
 - C The offspring with black fur are homozygous.
 - D The offspring with white fur is heterozygous.
- 14 Which process is used to separate the coloured compounds in chlorophyll?
- A chromatography
 - B distillation
 - C evaporation
 - D filtration
- 15 Which row identifies the types of elements that form covalent compounds and the physical properties of covalent compounds?

| | types of elements | physical property |
|----------|-----------------------|-------------------|
| A | metals and non-metals | high volatility |
| B | metals and non-metals | low volatility |
| C | non-metals only | high volatility |
| D | non-metals only | low volatility |

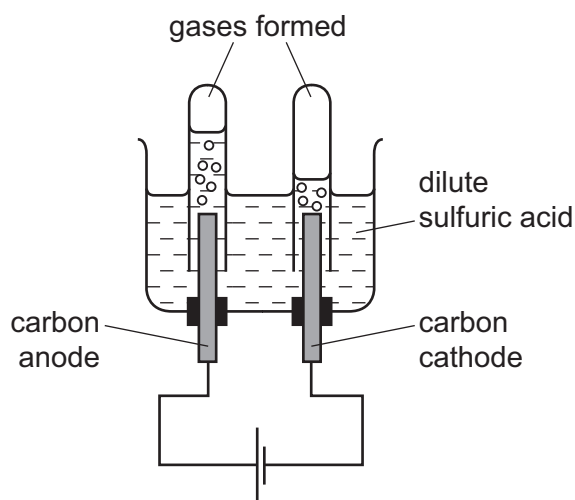
16 Nitrogen and hydrogen react to form ammonia.



How many molecules of ammonia are formed from 3 molecules of nitrogen, N_2 ?

- A** 2 **B** 3 **C** 6 **D** 12

17 Dilute sulfuric acid is electrolysed using the apparatus shown.



Which product forms at the cathode?

- A** hydrogen
B oxygen
C sulfur dioxide
D water

18 The table shows the initial and final temperatures of four different experiments.

| reaction | initial temperature /°C | final temperature /°C |
|----------|----------------------------|--------------------------|
| 1 | 20 | 20 |
| 2 | 20 | 30 |
| 3 | 25 | 20 |
| 4 | 25 | 30 |

Which reactions are exothermic?

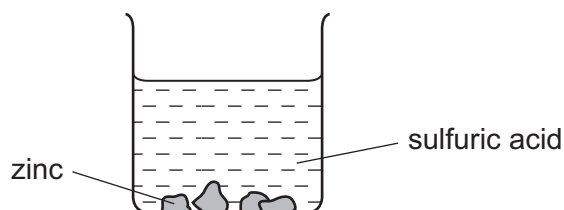
- A** 1 and 3 **B** 2 and 3 **C** 2 and 4 **D** 3 and 4

19 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

Which observation shows that the process is exothermic?

- A A blue solution forms.
- B A colourless solution forms.
- C The beaker feels cooler.
- D The beaker feels warmer.

20 Small lumps of zinc are added to sulfuric acid.

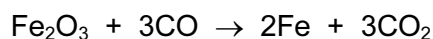


Which change increases the speed of the reaction?

- A Add the same mass of large lumps of zinc.
- B Decrease the concentration of sulfuric acid.
- C Decrease the surface area of zinc.
- D Increase the temperature of sulfuric acid.

21 Iron is produced in the blast furnace.

One of the reactions involved is shown below:



Which statement is correct?

- A Iron(III) oxide and carbon monoxide are both oxidised.
- B Iron(III) oxide and carbon monoxide are both reduced.
- C Iron(III) oxide is oxidised and carbon monoxide is reduced.
- D Iron(III) oxide is reduced and carbon monoxide is oxidised.

22 A student tests an aqueous solution for the presence of sulfate ions.

What is the correct test and observation for sulfate ions?

- A Acidify the solution and add silver ions to produce a cream precipitate.
- B Acidify the solution and add aqueous barium ions to produce a white precipitate.
- C Add aqueous iron(III) ions to produce a brown precipitate.
- D Add copper(II) ions to produce a pale blue precipitate.

23 Which row correctly identifies the types of oxides?

| | acidic oxides | basic oxides |
|---|-------------------------------------|-------------------------------------|
| A | CaO, Na ₂ O | CO ₂ , SO ₂ |
| B | CaO, SO ₂ | CO ₂ , Na ₂ O |
| C | CO ₂ , Na ₂ O | CaO, SO ₂ |
| D | CO ₂ , SO ₂ | CaO, Na ₂ O |

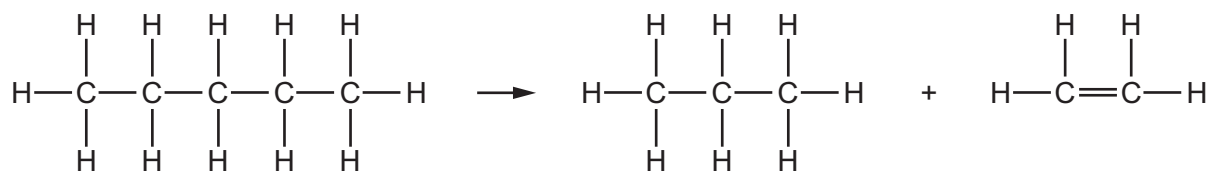
24 Which Group I metal and which Group VII non-metal react together most vigorously?

| | Group I | Group VII |
|---|-----------|-----------|
| A | potassium | bromine |
| B | potassium | chlorine |
| C | sodium | bromine |
| D | sodium | chlorine |

25 Which equation describes the manufacture of lime from limestone?

- A calcium carbonate → calcium hydroxide + carbon dioxide
- B calcium carbonate → calcium oxide + carbon dioxide
- C calcium hydroxide → calcium oxide + water
- D calcium oxide + carbon dioxide → calcium carbonate

26 An alkane molecule undergoes the chemical change shown:



What is the name of the chemical change?

- A cracking
- B fractional distillation
- C polymerisation
- D reduction

27 The main element present in coal is1..... .

When coal is2..... , an3..... gas that is harmful to trees is produced.

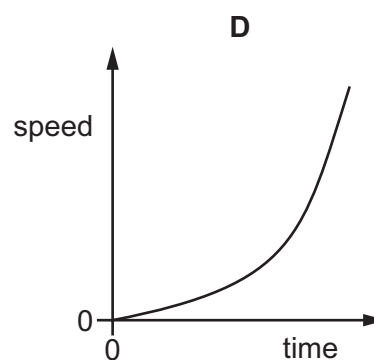
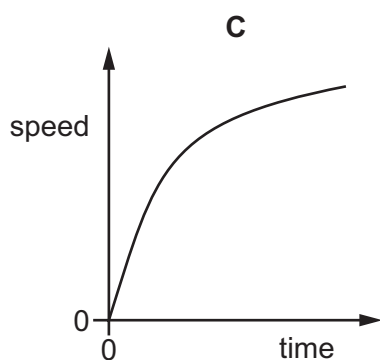
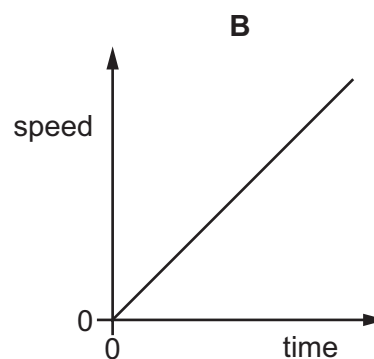
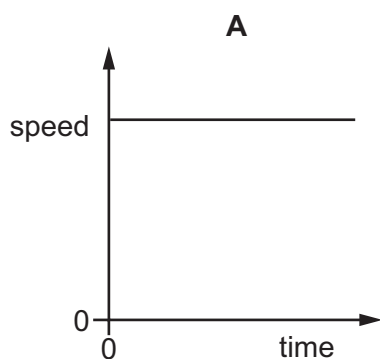
Which words correctly complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|----------|----------|-----------|----------|
| A | carbon | burned | acidic |
| B | carbon | distilled | alkaline |
| C | nitrogen | reduced | acidic |
| D | sulfur | burned | alkaline |

28 The diagram shows forces of equal size acting on a moving car.



Which speed/time graph represents the motion of the car?



29 A rectangular block of metal has dimensions of $5\text{ cm} \times 4\text{ cm} \times 3\text{ cm}$. The mass of the block is 162 g .

What is the density of the metal?

- A** 0.37 g/cm^3 **B** 2.7 g/cm^3 **C** 2700 g/cm^3 **D** 9720 g/cm^3

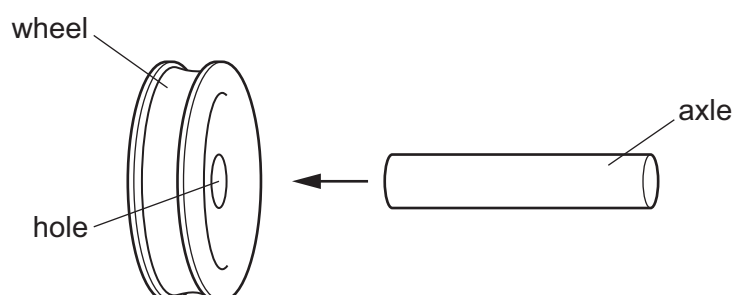
30 Which statement about reserves of fossil fuels is correct?

- A** They are limited but can be renewed.
B They are limited and cannot be renewed.
C They are unlimited and can be renewed.
D They are unlimited but cannot be renewed.

- 31 A motorist inflates a tyre with an air pump. The temperature of the air in the tyre remains constant.

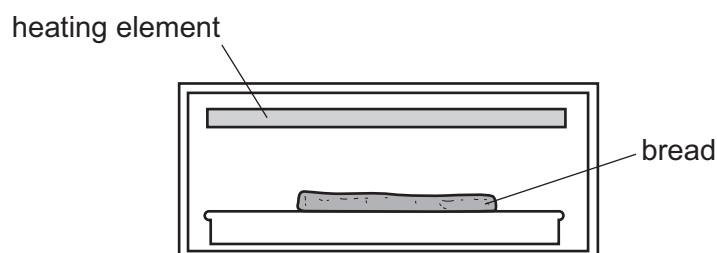
What has changed?

- A The air molecules hitting the inside of the tyre are moving more quickly.
 B The air molecules hitting the inside of the tyre are moving more slowly.
 C There are fewer molecules hitting the inside of the tyre.
 D There are more molecules hitting the inside of the tyre.
- 32 A metal wheel has to be fitted to an axle made from the same metal. The axle is larger than the hole in the wheel.



Which action could make it possible to fit the axle in the hole?

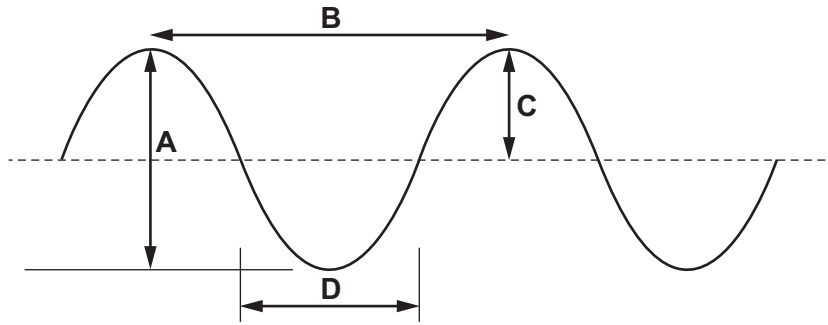
- A cooling the axle only
 B cooling the axle and cooling the wheel by the same temperature change
 C heating the axle only
 D heating the axle and heating the wheel by the same temperature change
- 33 Bread can be cooked by placing it below a heating element.



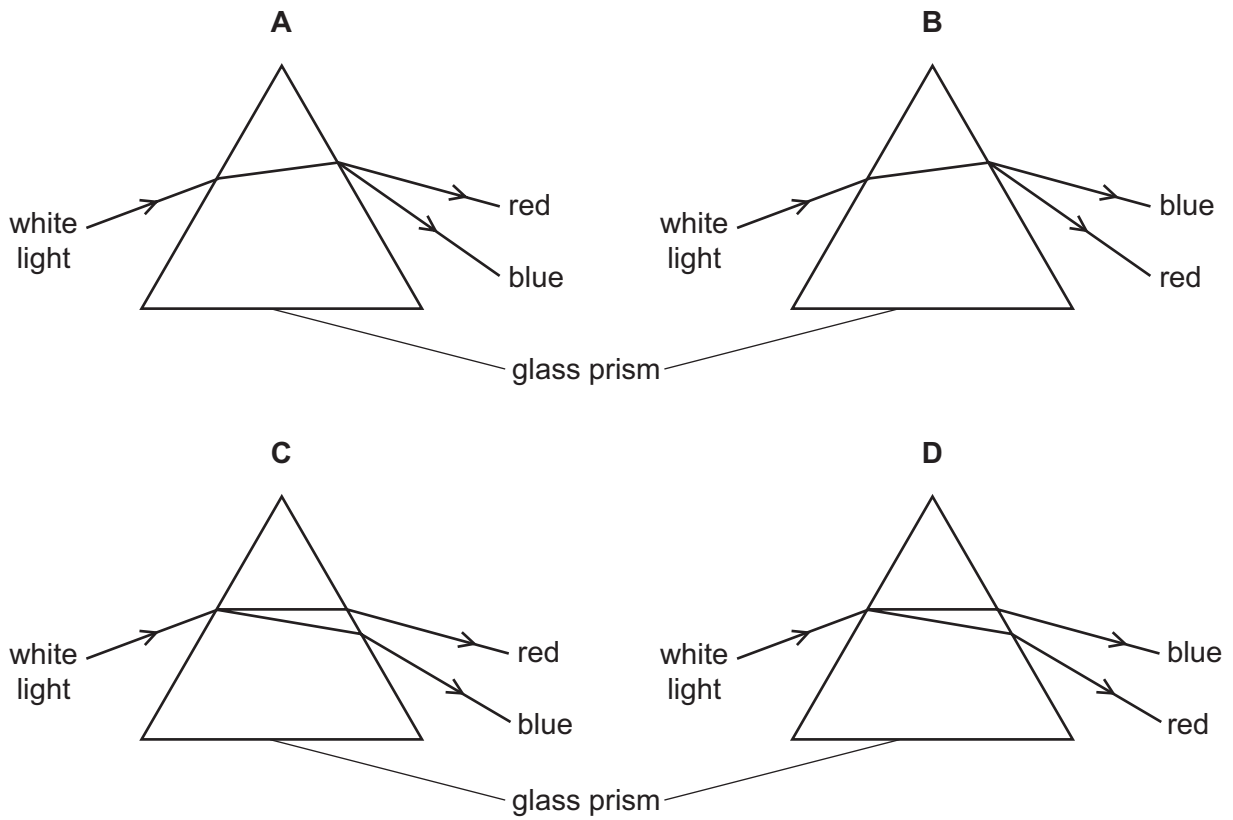
Which process transfers thermal energy from the heating element to the bread?

- A conduction
 B convection
 C evaporation
 D radiation

34 Which distance on the diagram represents the amplitude of the wave?



35 Which diagram shows the paths taken by the red light and by the blue light when a beam of white light enters a glass prism?

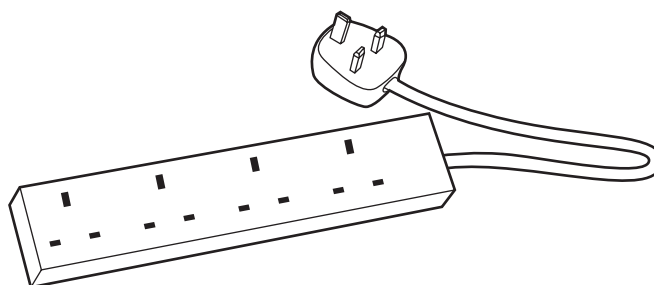


36 A sound wave has a certain amplitude and a certain frequency. The amplitude of the wave increases, and the frequency of the wave decreases.

What is the effect on the loudness of the sound and on the pitch of the sound?

| | loudness | pitch |
|----------|----------|--------|
| A | greater | higher |
| B | greater | lower |
| C | less | higher |
| D | less | lower |

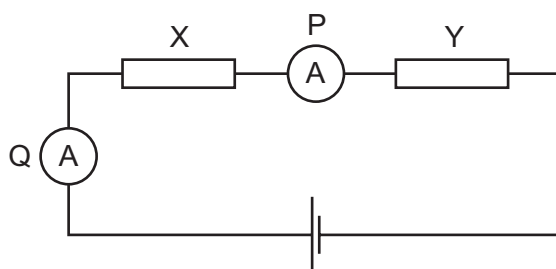
- 37 An electrical extension block has four sockets, a cable which can safely take a current of 6 A and a plug. It is protected by a fuse rated at 5 A.



The extension block is used with four appliances and the 5 A fuse blows. The owner replaces the 5 A fuse with a 13 A fuse.

Why is the extension block now dangerous?

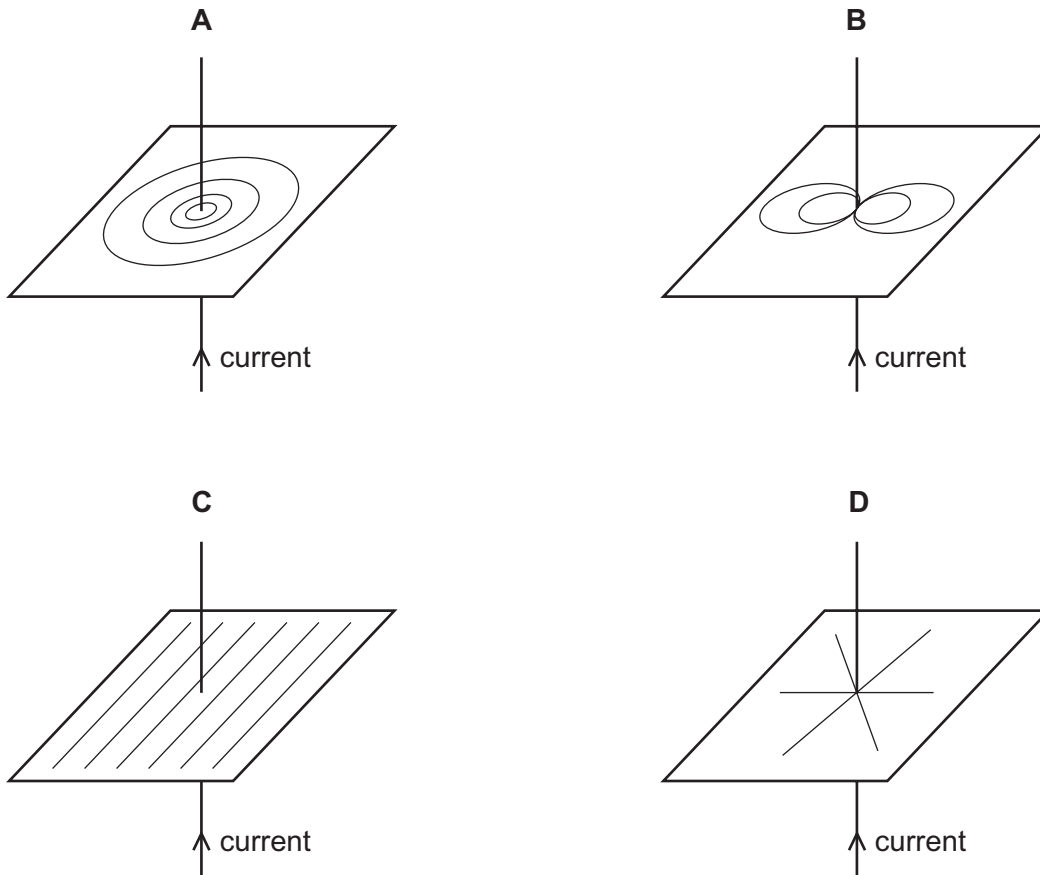
- A The appliances may overheat before the fuse blows.
 - B The cable may overheat before the fuse blows.
 - C The sockets may burn out before the fuse blows.
 - D The 13 A fuse may blow too soon.
- 38 A series circuit contains two resistors, X and Y, and two ammeters, P and Q.



Which ammeter shows the current in resistor Y?

- A ammeter P only
- B ammeter Q only
- C both ammeter P and ammeter Q
- D neither ammeter P nor ammeter Q

39 Which diagram shows the pattern of the magnetic field due to a current in a straight wire?



40 Radioactive sources that emit γ -rays are stored in special boxes.

The boxes have a lining to absorb the γ -rays.

Which is the best material for the lining?

- A aluminium
- B lead
- C paper
- D plastic

DATA SHEET
The Periodic Table of the Elements

| | | Group | | | | | | | | | | | | | | | | | | | |
|-----|-----|--------------------------------|------------------------------|-------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|------------------------------------|-------------------------------------|--|------------------------------------|----------------------------------|------------------------------------|------------------------------------|-------------------------------------|----------------------------------|----------------------------------|--|--|
| | | I | II | III | IV | V | VI | VII | VIII | IX | X | | | | | | | | | | |
| | | 1 H Hydrogen 1 | | | | | | | | | | | | | | | | | | | |
| 7 | 9 | Li Lithium 3 | Be Beryllium 4 | | | | | | | | | | | | | | | | | | |
| 23 | 24 | Na Sodium 11 | Mg Magnesium 12 | | | | | | | | | | | | | | | | | | |
| 39 | 40 | K Potassium 19 | 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 | 88 | Rb Rubidium 37 | Sr Strontium 38 | 89 Y Yttrium 39 | 91 Zr Zirconium 40 | 93 Nb Niobium 41 | 96 Mo Molybdenum 42 | 101 Ru Ruthenium 44 | 101 Rh Rhodium 45 | 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 | 137 | Cs Caesium 55 | Ba Barium 56 | 139 La Lanthanum 57 | 178 Hf Hafnium 72 | 181 Ta Tantalum 73 | 184 W Tungsten 74 | 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 | | | |
| 87 | 226 | Fr Francium 87 | Ra Radium 88 | 227 Ac Actinium 89 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 159 Tb Terbium 65 | | | | | | | | | |
| | | | | | | | | | | | | 157 Gd Gadolinium 64 | | | | | | | | | |
| | | | | | | | | | | | | 152 Eu Europium 63 | | | | | | | | | |
| | | | | | | | | | | | | 150 Sm Samarium 62 | | | | | | | | | |
| | | | | | | | | | | | | 144 Nd Neodymium 60 | | | | | | | | | |
| | | | | | | | | | | | | 141 Pr Praseodymium 59 | | | | | | | | | |
| | | | | | | | | | | | | 140 Ce Cerium 58 | | | | | | | | | |
| | | | | | | | | | | | | 238 U Uranium 92 | | | | | | | | | |
| | | | | | | | | | | | | 232 Th Thorium 90 | | | | | | | | | |
| | | | | | | | | | | | | 97 Bk Berkelium 97 | | | | | | | | | |
| | | | | | | | | | | | | 96 Cm Curium 96 | | | | | | | | | |
| | | | | | | | | | | | | 95 Am Americium 95 | | | | | | | | | |
| | | | | | | | | | | | | 94 Pu Plutonium 94 | | | | | | | | | |
| | | | | | | | | | | | | 93 Np Neptunium 93 | | | | | | | | | |
| | | | | | | | | | | | | 91 Pa Protactinium 91 | | | | | | | | | |
| | | | | | | | | | | | | 89 Lr Lawrencium 103 | | | | | | | | | |
| | | | | | | | | | | | | 102 No Nobelium 102 | | | | | | | | | |
| | | | | | | | | | | | | 101 Md Mendelevium 101 | | | | | | | | | |
| | | | | | | | | | | | | 100 Fm Fermium 100 | | | | | | | | | |
| | | | | | | | | | | | | 99 Es Einsteinium 99 | | | | | | | | | |
| | | | | | | | | | | | | 98 Cf Californium 98 | | | | | | | | | |
| | | | | | | | | | | | | 86 Rn Radon 86 | | | | | | | | | |
| | | | | | | | | | | | | 85 At Astatine 85 | | | | | | | | | |
| | | | | | | | | | | | | 84 Po Polonium 84 | | | | | | | | | |
| | | | | | | | | | | | | 83 Bi Bismuth 83 | | | | | | | | | |
| | | | | | | | | | | | | 82 Pb Lead 82 | | | | | | | | | |
| | | | | | | | | | | | | 81 Tl Thallium 81 | | | | | | | | | |
| | | | | | | | | | | | | 80 Hg Mercury 80 | | | | | | | | | |
| | | | | | | | | | | | | 79 Au Gold 79 | | | | | | | | | |
| | | | | | | | | | | | | 78 Pt Platinum 78 | | | | | | | | | |
| | | | | | | | | | | | | 77 Ir Iridium 77 | | | | | | | | | |
| | | | | | | | | | | | | 76 Os Osmium 76 | | | | | | | | | |
| | | | | | | | | | | | | 75 Re Rhenium 75 | | | | | | | | | |
| | | | | | | | | | | | | 74 W Tungsten 74 | | | | | | | | | |
| | | | | | | | | | | | | 73 Ta Tantalum 73 | | | | | | | | | |
| | | | | | | | | | | | | 72 Hf Hafnium 72 | | | | | | | | | |
| | | | | | | | | | | | | 71 Lu Lutetium 71 | | | | | | | | | |
| | | | | | | | | | | | | 70 Yb Ytterbium 70 | | | | | | | | | |
| | | | | | | | | | | | | 69 Tm Thulium 69 | | | | | | | | | |
| | | | | | | | | | | | | 68 Er Erbium 68 | | | | | | | | | |
| | | | | | | | | | | | | 67 Ho Holmium 67 | | | | | | | | | |
| | | | | | | | | | | | | 66 Dy Dysprosium 66 | | | | | | | | | |
| | | | | | | | | | | | | 65 Tb Terbium 65 | | | | | | | | | |
| | | | | | | | | | | | | 64 Gd Gadolinium 64 | | | | | | | | | |
| | | | | | | | | | | | | 63 Eu Europium 63 | | | | | | | | | |
| | | | | | | | | | | | | 62 Sm Samarium 62 | | | | | | | | | |
| | | | | | | | | | | | | 61 Pm Promethium 61 | | | | | | | | | |
| | | | | | | | | | | | | 60 Nd Neodymium 60 | | | | | | | | | |
| | | | | | | | | | | | | 59 Pr Praseodymium 59 | | | | | | | | | |
| | | | | | | | | | | | | 58 Ce Cerium 58 | | | | | | | | | |
| | | | | | | | | | | | | 57 La Lanthanum 57 | | | | | | | | | |
| | | | | | | | | | | | | 56 Ba Barium 56 | | | | | | | | | |
| | | | | | | | | | | | | 55 Cs Caesium 55 | | | | | | | | | |
| | | | | | | | | | | | | 54 Xe Xenon 54 | | | | | | | | | |
| | | | | | | | | | | | | 53 I Iodine 53 | | | | | | | | | |
| | | | | | | | | | | | | 52 Te Tellurium 52 | | | | | | | | | |
| | | | | | | | | | | | | 51 Sb Antimony 51 | | | | | | | | | |
| | | | | | | | | | | | | 50 Sn Tin 50 | | | | | | | | | |
| | | | | | | | | | | | | 49 In Indium 49 | | | | | | | | | |
| | | | | | | | | | | | | 48 Cd Cadmium 48 | | | | | | | | | |
| | | | | | | | | | | | | 47 Ag Silver 47 | | | | | | | | | |
| | | | | | | | | | | | | 46 Pd Palladium 46 | | | | | | | | | |
| | | | | | | | | | | | | 45 Rh Rhodium 45 | | | | | | | | | |
| | | | | | | | | | | | | 44 Ru Ruthenium 44 | | | | | | | | | |
| | | | | | | | | | | | | 43 Tc Technetium 43 | | | | | | | | | |
| | | | | | | | | | | | | 42 Mo Molybdenum 42 | | | | | | | | | |
| | | | | | | | | | | | | 41 Nb Niobium 41 | | | | | | | | | |
| | | | | | | | | | | | | 40 Zr Zirconium 40 | | | | | | | | | |
| | | | | | | | | | | | | 39 Y Yttrium 39 | | | | | | | | | |
| | | | | | | | | | | | | 38 Sr Strontium 38 | | | | | | | | | |
| | | | | | | | | | | | | 37 Rb Rubidium 37 | | | | | | | | | |
| | | | | | | | | | | | | 36 Kr Krypton 36 | | | | | | | | | |
| | | | | | | | | | | | | 35 Br Bromine 35 | | | | | | | | | |
| | | | | | | | | | | | | 34 Se Selenium 34 | | | | | | | | | |
| | | | | | | | | | | | | 33 As Arsenic 33 | | | | | | | | | |
| | | | | | | | | | | | | 32 S Sulfur 16 | | | | | | | | | |
| | | | | | | | | | | | | 31 P Phosphorus 15 | | | | | | | | | |
| | | | | | | | | | | | | 30 Si Silicon 14 | | | | | | | | | |
| | | | | | | | | | | | | 29 Al Aluminium 13 | | | | | | | | | |
| | | | | | | | | | | | | 28 Ar Argon 18 | | | | | | | | | |
| | | | | | | | | | | | | 27 Cl Chlorine 17 | | | | | | | | | |
| | | | | | | | | | | | | 26 S Sulfur 16 | | | | | | | | | |
| | | | | | | | | | | | | 25 P Phosphorus 15 | | | | | | | | | |
| | | | | | | | | | | | | 24 Ne Neon 10 | | | | | | | | | |
| | | | | | | | | | | | | 23 F Fluorine 9 | | | | | | | | | |
| | | | | | | | | | | | | 22 O Oxygen 8 | | | | | | | | | |
| | | | | | | | | | | | | 21 N Nitrogen 7 | | | | | | | | | |
| | | | | | | | | | | | | 20 C Carbon 6 | | | | | | | | | |
| | | | | | | | | | | | | 19 B Boron 5 | | | | | | | | | |
| | | | | | | | | | | | | 18 He Helium 2 | | | | | | | | | |
| | | | | | | | | | | | | 17 Ne Neon 10 | | | | | | | | | |
| | | | | | | | | | | | | 16 Ar Argon 18 | | | | | | | | | |
| | | | | | | | | | | | | 15 Kr Krypton 36 | | | | | | | | | |
| | | | | | | | | | | | | 14 Xe Xenon 54 | | | | | | | | | |
| | | | | | | | | | | | | 13 Rn Radon 86 | | | | | | | | | |
| | | | | | | | | | | | | 12 He Helium 2 | | | | | | | | | |

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

| | |
|---|----------|
| a | X |
| b | |

 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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