



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

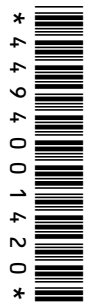
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Paper 2 Multiple Choice (Extended)

May/June 2017

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.

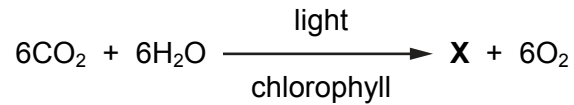
A copy of the Periodic Table is printed on page 16.

Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

- 1 Which structural feature is found in a plant cell but **not** in an animal cell?
- A cell membrane
 - B cell wall
 - C cytoplasm
 - D nucleus

- 2 The balanced equation for photosynthesis is shown.



What is **X**?

- A $\text{C}_6\text{H}_{12}\text{O}_6$
 - B $\text{C}_6\text{H}_{12}\text{O}_{12}$
 - C $\text{C}_{12}\text{H}_6\text{O}_6$
 - D $\text{C}_{12}\text{H}_{12}\text{O}_2$
- 3 An enzyme from the alimentary canal has an optimum activity at an acidic pH.
Which statement is correct?
- A The enzyme is an amylase and is found in the mouth.
 - B The enzyme is a protease and is found in the mouth.
 - C The enzyme is an amylase and is found in the stomach.
 - D The enzyme is a protease and is found in the stomach.
- 4 In a plant, what leads to offspring that are identical to the parent?
- A asexual reproduction
 - B insect pollination
 - C seed germination
 - D sexual reproduction
- 5 Why do food chains usually have fewer than five trophic levels?
- A Decomposers are not usually included in the chain.
 - B Energy is lost between each trophic level.
 - C There is only one level of carnivores.
 - D There is only one level of herbivores.

6 What is the function of microorganisms in yoghurt making?

- A They make the sugar in milk become solid.
- B They produce lactic acid.
- C They raise the pH of the mixture.
- D They reduce the fat content of the milk.

7 Which statement about how the eye views near objects (accommodation) is correct?

| | ciliary muscles | suspensory ligaments | lens shape |
|----------|-----------------|----------------------|---------------|
| A | contract | slacken | thick (fat) |
| B | contract | stretch | thin (narrow) |
| C | relax | slacken | thin (narrow) |
| D | relax | stretch | thick (fat) |

8 In a plant, the allele for red flowers is dominant to the allele for yellow flowers. A heterozygous red-flowered plant is crossed with a homozygous yellow-flowered plant.

Which statement about the offspring is correct?

- A 25% will have red flowers, 75% will have yellow flowers.
- B 50% will have red flowers, 50% will have yellow flowers.
- C 75% will have red flowers, 25% will have yellow flowers.
- D 100% will have red flowers, 0% will have yellow flowers.

9 Why is breast-feeding of babies often recommended in preference to bottle-feeding?

- A Breast milk contains antibodies.
- B Breast milk contains protein.
- C Breast milk has no bacteria.
- D Breast milk is at body temperature.

10 Why is yeast added to dough in the production of bread?

- A to lower the pH
- B to produce alcohol
- C to produce carbon dioxide
- D to produce lactic acid

11 A blood cell is travelling through the hepatic vein.

Which blood vessel will it travel through next?

- A hepatic artery
- B pulmonary artery
- C pulmonary vein
- D vena cava

12 A scientist took a single living cheek cell from each of 30 different people. 15 of these people were male and 15 were female. He stained each cell so that the sex chromosomes could be observed.

How many X chromosomes would the scientist observe?

- A 15 B 30 C 45 D 60

13 What may be defined as ‘an action by an organism or part of an organism causing a change of position or place’?

- A growth
- B movement
- C reproduction
- D sensitivity

14 Which row shows the electronic structure of a calcium atom and of a fluoride ion?

| | calcium atom | fluoride ion |
|----------|--------------|--------------|
| A | 2,8,8 | 2,7 |
| B | 2,8,8 | 2,8 |
| C | 2,8,8,2 | 2,7 |
| D | 2,8,8,2 | 2,8 |

15 How many atoms of metals and of non-metals are shown in the formula Na_2SO_4 ?

| | atoms of metals | atoms of non-metals |
|----------|-----------------|---------------------|
| A | 1 | 1 |
| B | 1 | 2 |
| C | 2 | 4 |
| D | 2 | 5 |

16 The electrolysis of concentrated aqueous sodium chloride is an important industrial process.

During this process1..... is produced at the cathode and2..... is produced at the anode. The solution formed turns litmus3..... .

Which words complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|----------|----------|----------|------|
| A | hydrogen | chlorine | blue |
| B | hydrogen | oxygen | blue |
| C | sodium | chlorine | red |
| D | sodium | oxygen | red |

17 Aqueous sodium thiosulfate reacts with dilute hydrochloric acid.

Increasing the concentration of sodium thiosulfate increases the rate of reaction.

Which statement explains this observation?

- A** The particles are closer together and collide more frequently.
- B** The particles are closer together and collide with more energy.
- C** The particles have a greater surface area and collide more frequently.
- D** The particles have more energy and collide more frequently.

18 In which word equation is the underlined substance being oxidised?

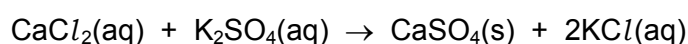
- A** carbon dioxide + carbon \rightarrow carbon monoxide
- B** carbon monoxide + iron oxide \rightarrow carbon dioxide + iron
- C** copper oxide + magnesium \rightarrow magnesium oxide + copper
- D** magnesium oxide + hydrochloric acid \rightarrow magnesium chloride + water

19 The pH of water changes when ammonia is bubbled into it.

What happens to the pH and why?

| | pH | ammonia is |
|----------|-----------|------------|
| A | decreases | acidic |
| B | decreases | alkaline |
| C | increases | acidic |
| D | increases | alkaline |

20 The equation for the reaction between aqueous calcium chloride and aqueous potassium sulfate is shown.



Which process is **not** used to produce the pure salt calcium sulfate?

- A** crystallisation of the salt from solution
- B** filtration to collect the salt
- C** mixing two soluble salts together
- D** washing the salt with cold water

21 Which statement describes the structure of sodium chloride?

- A** contains alternating positive and negative ions
- B** contains an irregular arrangement of ions
- C** contains positive ions only
- D** is a giant covalent structure

22 Nickel is a metal.

Three statements about nickel are listed.

- 1 It is a good conductor of electricity.
- 2 It has a low melting point.
- 3 It is shiny.

Which statements about the properties of nickel are correct?

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

23 Which row shows a chemical test for the presence of water?

| | substance | colour change |
|----------|-------------------------------|---------------|
| A | anhydrous cobalt(II) chloride | pink to blue |
| B | anhydrous cobalt(II) chloride | white to blue |
| C | anhydrous copper(II) sulfate | pink to blue |
| D | anhydrous copper(II) sulfate | white to blue |

24 Modern cars are fitted with catalytic converters to reduce the pollution of the atmosphere.

Carbon monoxide is produced by the1..... combustion of petrol.

Nitrogen monoxide is produced in the car engine.

The nitrogen monoxide is2..... by the carbon monoxide in the catalytic converter to produce3..... .

Which words complete gaps 1, 2 and 3?

| | 1 | 2 | 3 |
|----------|------------|----------|------------------|
| A | complete | oxidised | nitrogen dioxide |
| B | complete | reduced | nitrogen |
| C | incomplete | oxidised | nitrogen dioxide |
| D | incomplete | reduced | nitrogen |

25 Why do farmers add lime to soil?

- A** It acts as a fertiliser.
- B** It adds nitrogen to the soil.
- C** It decreases the pH of the soil.
- D** It increases the pH of the soil.

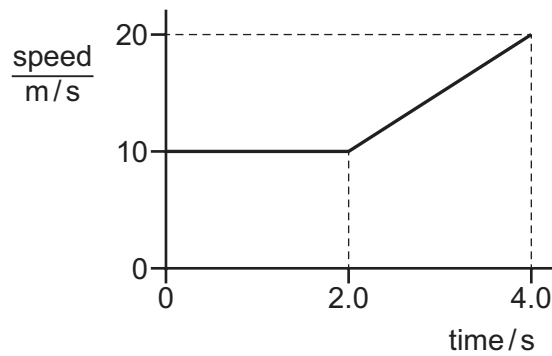
26 Which statement about the products of the fractional distillation of petroleum is **not** correct?

- A** Fractions obtained from high up the fractional distillation column contain small molecules.
- B** Fractions obtained from low down the fractional distillation column have low boiling points.
- C** Large molecules have large intermolecular attractive forces.
- D** Refinery gas is used for cooking and heating.

27 What is the structure of poly(ethene) and what type of polymerisation is used to make it?

| | structure of polymer | type of polymerisation |
|----------|----------------------|------------------------|
| A | | addition |
| B | | condensation |
| C | | addition |
| D | | condensation |

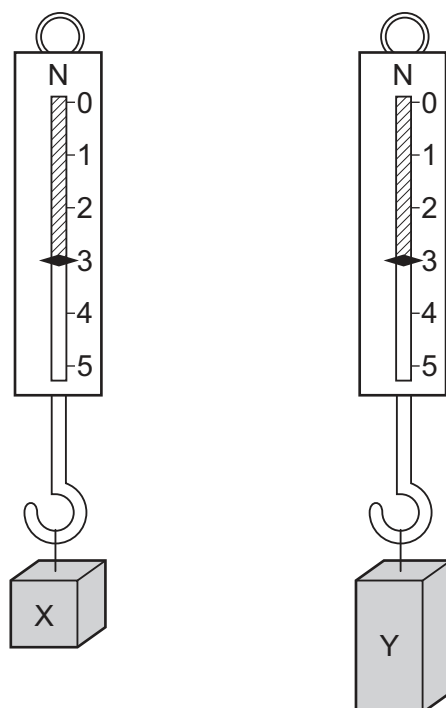
28 The diagram is a speed-time graph for a moving object.



What is the distance travelled by the object in 4.0 s?

- A** 30 m **B** 40 m **C** 50 m **D** 80 m

29 Two blocks of metal, X and Y, hang from spring balances as shown.



What does the diagram show about X and Y?

- A They have the same mass and the same volume but different weights.
 - B They have the same mass and the same weight but different volumes.
 - C They have the same mass, the same volume and the same weight.
 - D They have the same weight and the same volume but different masses.
- 30 A spring of unstretched length 5.0 cm has a spring constant k of 20 N/cm. A load is suspended from the spring and its new length is 8.5 cm.

What is the weight of the load?

- A 0.70 N
 - B 1.7 N
 - C 70 N
 - D 170 N
- 31 The Sun is an important energy resource.

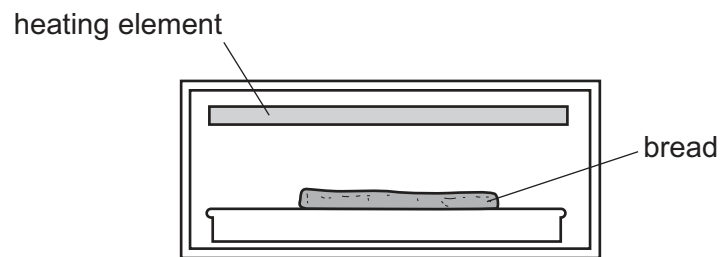
Which energy source powers the Sun?

- A chemical
- B geothermal
- C nuclear fission
- D nuclear fusion

- 32 A sample of a substance has a mass of 2.0 kg. The sample gains 40 000 J of energy and this causes its temperature to change from 10 °C to 50 °C.

What is the specific heat capacity of the substance?

- A 400 J/(kg °C)
 - B 500 J/(kg °C)
 - C 800 J/(kg °C)
 - D 1000 J/(kg °C)
- 33 Bread can be cooked by placing it below a heating element.

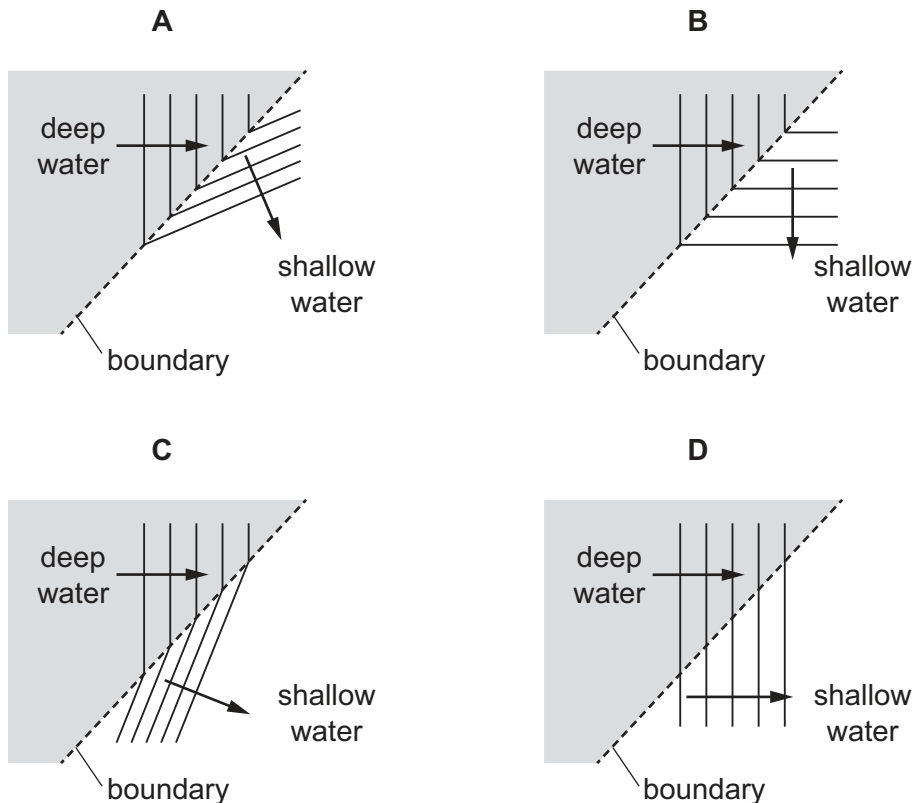


Which process transfers thermal energy from the heating element to the bread?

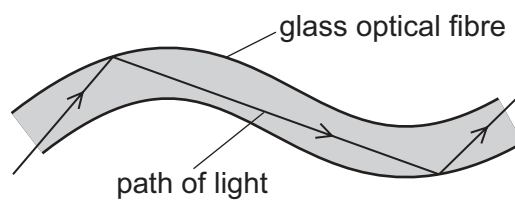
- A conduction
- B convection
- C evaporation
- D radiation

- 34 The diagrams show a water wave travelling towards a boundary. At the boundary, the wave passes from deep water into shallow water and its speed decreases. Arrows indicate the direction of the wave.

Which diagram shows the wave in the shallow water?



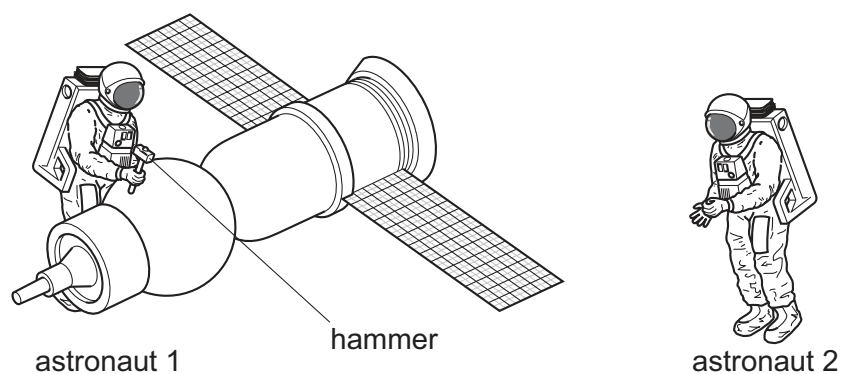
- 35 The diagram shows light passing along a glass optical fibre.



Which description applies to the optical fibre?

- A A maximum amount of light is absorbed by the glass.
- B Light waves reflect inside the fibre.
- C Microwaves can be transmitted in the fibre.
- D The signal strengthens as the length of the fibre increases.

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

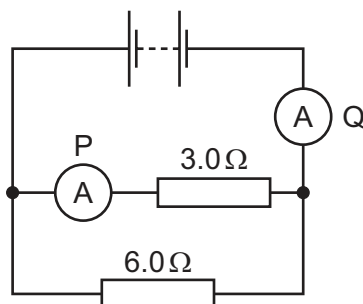


What does astronaut 2 hear compared with the sound heard if they were working on Earth?

- A** a louder sound
B a quieter sound
C a sound of the same loudness
D no sound at all
- 37 Which quantity is related to the flow of charge and which quantity is defined in terms of the energy supplied by a source in driving charge round a complete circuit?

| | flow of charge | energy supplied by a source |
|----------|----------------|-----------------------------|
| A | current | e.m.f. |
| B | current | p.d. |
| C | resistance | e.m.f. |
| D | resistance | p.d. |

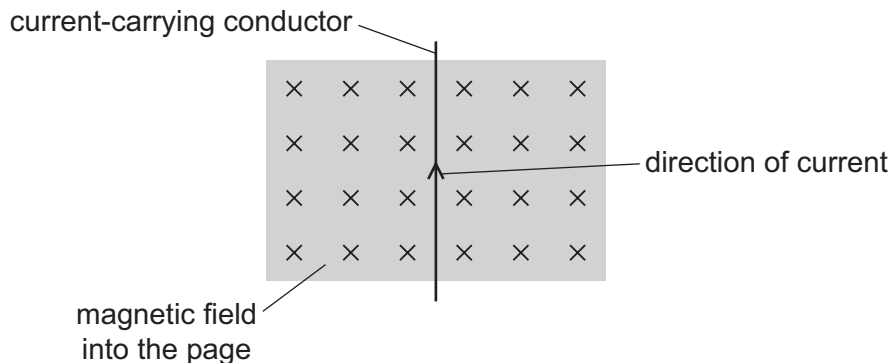
- 38 A battery is connected to a $3.0\ \Omega$ resistor, a $6.0\ \Omega$ resistor and two ammeters P and Q.



What is the combined resistance of the two resistors and which ammeter has the greater reading?

| | combined resistance / Ω | ammeter with greater reading |
|----------|--------------------------------|------------------------------|
| A | less than 3.0 | P |
| B | less than 3.0 | Q |
| C | 9.0 | P |
| D | 9.0 | Q |

- 39 A current-carrying conductor is placed in a magnetic field that is directed into the page.



The conductor experiences a force due to the magnetic field.

In which direction does the force act?

- A** into the page
- B** out of the page
- C** to the left
- D** to the right

- 40 Which row compares the number of protons and the number of neutrons in atoms of different isotopes of an element?

| | number of protons | number of neutrons |
|----------|-------------------|--------------------|
| A | different | different |
| B | different | the same |
| C | the same | different |
| D | the same | the same |

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The Periodic Table of Elements

| | | Group | | | | | | | | | | | | | | | |
|-----------------------------------|------------------------------------|--|--|------------------------------------|-------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|------------------------------------|--------------------------------------|------------------------------------|-------------------------------------|----------------------------------|----------------------------------|
| I | II | III | IV | V | VI | VII | VIII | | | | | | | | | | |
| 3 Li lithium 7 | 4 Be beryllium 9 | <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> Key atomic number atomic symbol name relative atomic mass </div> | | | | | | | | | | 2 He helium 4 | | | | | |
| 11 Na sodium 23 | 12 Mg magnesium 24 | | | | | | | | | | | 5 B boron 11 | 6 C carbon 12 | 7 N nitrogen 14 | 8 O oxygen 16 | 9 F fluorine 19 | 10 Ne neon 20 |
| 19 K potassium 39 | 20 Ca calcium 40 | 21 Sc scandium 45 | 22 Ti titanium 48 | 23 V vanadium 51 | 24 Cr chromium 52 | 25 Mn manganese 55 | 26 Fe iron 56 | 27 Co cobalt 59 | 28 Ni nickel 59 | 29 Cu copper 64 | 30 Zn zinc 65 | 31 Ga gallium 70 | 32 Ge germanium 73 | 33 As arsenic 75 | 34 Se selenium 79 | 35 Br bromine 80 | 36 Kr krypton 84 |
| 37 Rb rubidium 85 | 38 Sr strontium 88 | 39 Y yttrium 89 | 40 Zr zirconium 91 | 41 Nb niobium 93 | 42 Mo molybdenum 96 | 43 Tc technetium — | 44 Ru ruthenium 101 | 45 Rh rhodium 103 | 46 Pd palladium 106 | 47 Ag silver 108 | 48 Cd cadmium 112 | 49 In indium 115 | 50 Sn tin 119 | 51 Sb antimony 122 | 52 Te tellurium 128 | 53 I iodine 127 | 54 Xe xenon 131 |
| 55 Cs caesium 133 | 56 Ba barium 137 | 57–71 lanthanoids | 72 Hf hafnium 178 | 73 Ta tantalum 181 | 74 W tungsten 184 | 75 Re rhenium 186 | 76 Os osmium 190 | 77 Ir iridium 192 | 78 Pt platinum 195 | 79 Au gold 197 | 80 Hg mercury 201 | 81 Tl thallium 204 | 82 Pb lead 207 | 83 Bi bismuth 209 | 84 Po polonium — | 85 At astatine — | 86 Rn radon — |
| 87 Fr francium — | 88 Ra radium — | 89–103 actinoids | 104 Rf rutherfordium — | 105 Db dubnium — | 106 Sg seaborgium — | 107 Bh bohrium — | 108 Hs hassium — | 109 Mt meitnerium — | 110 Ds darmstadtium — | 111 Rg roentgenium — | 112 Cn copernicium — | 114 Fl flerovium — | 116 Lv livermorium — | — | — | — | — |

| | | | | | | | | | | | | | | | |
|-------------|-------------------------------------|-----------------------------------|--|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|--------------------------------------|-----------------------------------|--------------------------------------|-------------------------------------|----------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|
| lanthanoids | 57 La lanthanum 139 | 58 Ce cerium 140 | 59 Pr praseodymium 141 | 60 Nd neodymium 144 | 61 Pm promethium — | 62 Sm samarium 150 | 63 Eu europium 152 | 64 Gd gadolinium 157 | 65 Tb terbium 159 | 66 Dy dysprosium 163 | 67 Ho holmium 165 | 68 Er erbium 167 | 69 Tm thulium 169 | 70 Yb ytterbium 173 | 71 Lu lutetium 175 |
| actinoids | 89 Ac actinium — | 90 Th thorium 232 | 91 Pa protactinium 231 | 92 U uranium 238 | 93 Np neptunium — | 94 Pu plutonium — | 95 Am americium — | 96 Cm curium — | 97 Bk berkelium — | 98 Cf californium — | 99 Es einsteinium — | 100 Fm fermium — | 101 Md mendelevium — | 102 No nobelium — | 103 Lr lawrencium — |

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).