GradeMax

* 0000800000001 * DFD

CAMBRIDGE
International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

* 5 3 5 2 4 5 5 5 3 6 *

COMBINED SCIENCE **0653/43**

Paper 4 Theory (Extended) **May/June 2026**

1 hour 15 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- You may use a calculator.
- You should show all your working and use appropriate units.
- Take the weight of 1.0 kg to be 9.8 N (acceleration of free fall = 9.8 m / s^2).

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].
- The Periodic Table is printed in the question paper.

This document has **20** pages.

DC (WW/TC) 359440/2
© Cambridge University Press & Assessment 2026

[Turn over

GradeMax

1 **(a)** Figure 1.1 shows an insect-pollinated flower.



Figure 1.1

Table 1.1 shows some information about the parts labelled in Figure 1.1.

Complete Table 1.1.

Table 1.1

name of part	letter	function of part
stigma	.....	pollination
filament	**S**	.....
.....	**T**	.....

[3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(b) Describe the difference between pollination and fertilisation in plants.

.....

.....

.....

..... [2]

(c) Plants have root hair cells on their roots.

Explain the role of active transport in root hair cells.

.....

.....

.....

.....

..... [3]

[Total: 8]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

PapaCambridge papacambridge.com

GradeMax

2 **(a)** Figure 2.1 is a diagram of the human heart.

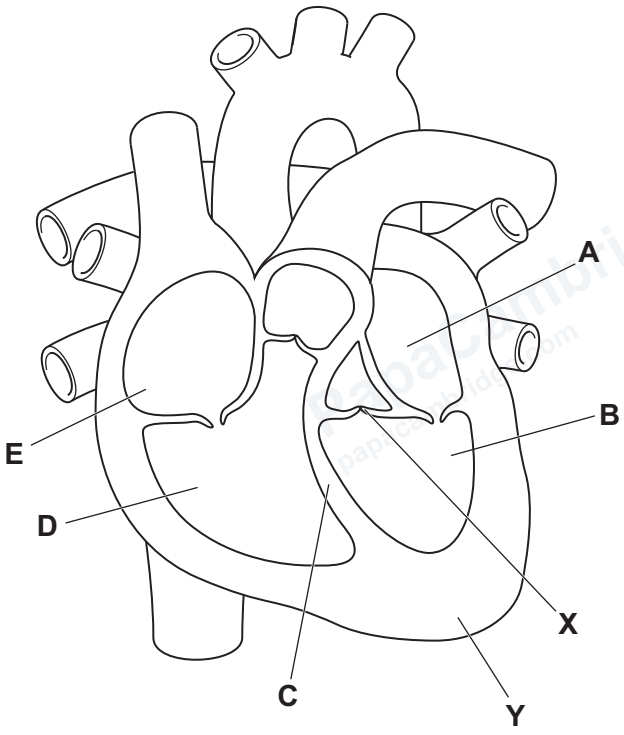


Figure 2.1

(i) Use the letters **A–E** on Figure 2.1 to identify the:

right ventricle .....

septum. .....

[2]

(ii) Describe the role of the parts labelled **X** and **Y** in Figure 2.1 in the movement of blood through the heart.

X .....

.....

Y .....

.....

[2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(b) A student measures their heart rate before, during and after physical activity.

Figure 2.2 shows their results.

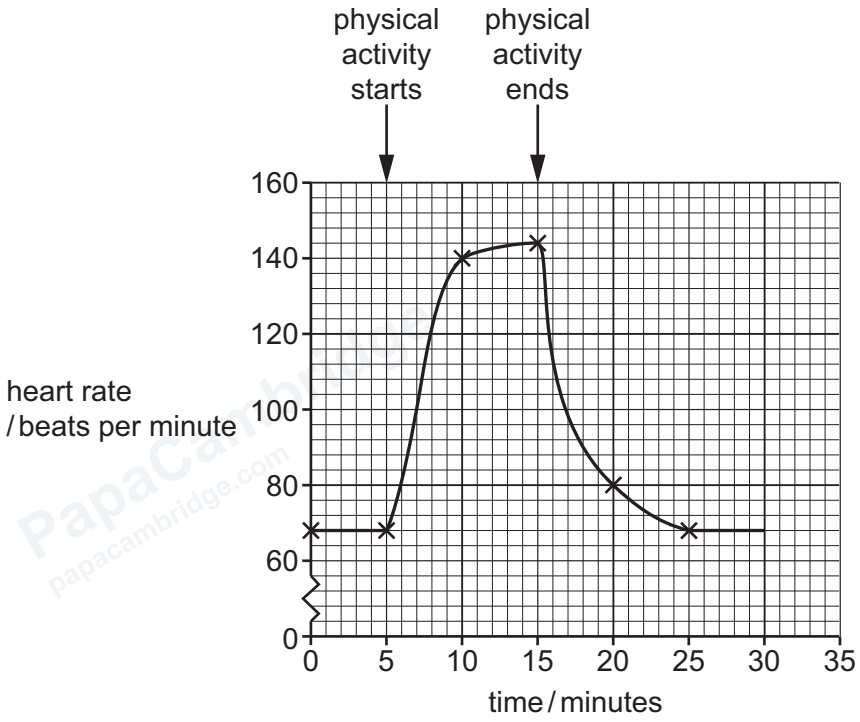


Figure 2.2

(i) Calculate the percentage increase in heart rate between the time physical activity starts and ends shown in Figure 2.2.

percentage increase = ... [3]

(ii) Explain the change in heart rate between 15 minutes and 20 minutes shown in Figure 2.2.

.....

.....

.....

.....

..... [3]

[Total: 10]

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

3 **(a)** Proteins and carbohydrates are part of a balanced diet.

(i) Name **one** element present in proteins that is **not** present in carbohydrates.

..... [1]

(ii) Lipase is an enzyme that has a role in digestion.

Explain why lipase will **not** digest proteins.

.....

.....

.....

.....

..... [3]

(b) Figure 3.1 shows part of a food web.

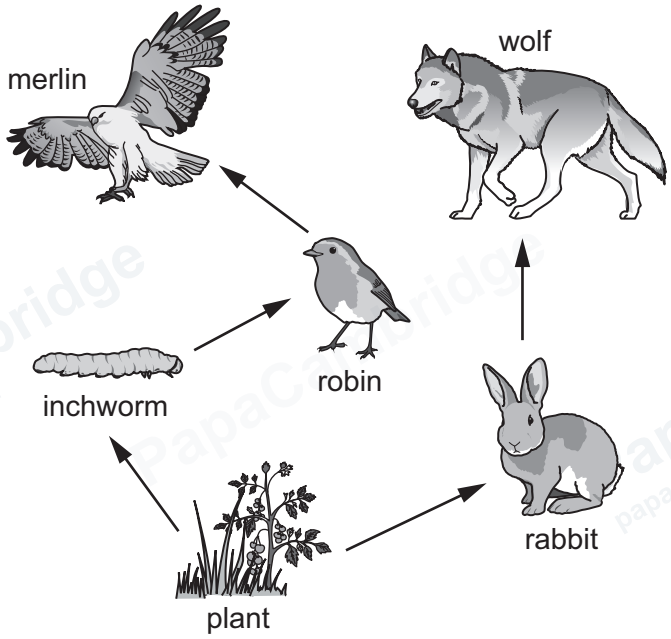


Figure 3.1

(i) Circle the word that describes the rabbit in Figure 3.1.

carnivore **decomposer** **herbivore** **producer**

[1]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(ii) Complete the sentences to describe how energy is transferred from the principal source to the merlin in Figure 3.1.

The principal source of energy input to biological systems is

the ..... .

Energy from light is absorbed in plants by the green pigment

called ..... .

The green pigment transfers this energy into ..... energy.

Energy is then transferred from the plant to the .....

and then to the robin, before being transferred to the merlin.

[4]

[Total: 9]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

PapaCambridge
papacambridge.com

GradeMax

4 **(a)** The reaction between sodium metal and chlorine gas is investigated.

Hot sodium is placed into a gas jar containing chlorine gas.

White smoke containing sodium chloride is produced.

The apparatus is shown in Figure 4.1.

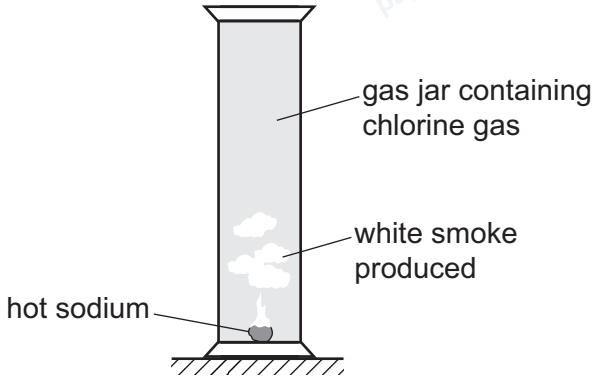


Figure 4.1

(i) Give the balanced symbol equation for this reaction.

..... [2]

(ii) State the colour of chlorine gas.

..... [1]

(iii) In Table 4.1, tick (✓) to show if each statement about chlorine is true or false.

Table 4.1

statement	true	false
Chlorine contains covalent bonds.		
Chlorine is less reactive than bromine.		
Chlorine displaces iodine from aqueous potassium iodide.		
Chlorine bleaches damp litmus paper.		

[3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(b) Figure 4.2 shows an atom of sodium and an atom of chlorine.

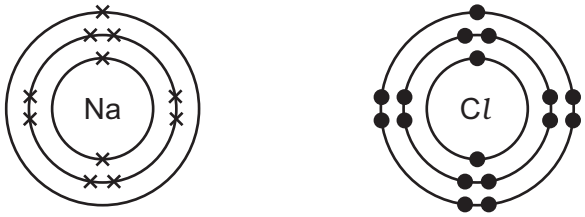


Figure 4.2

Complete the dot-and-cross diagram in Figure 4.3 to show the outer-shell electrons for each ion in sodium chloride, NaCl.

Include the charge on each ion.

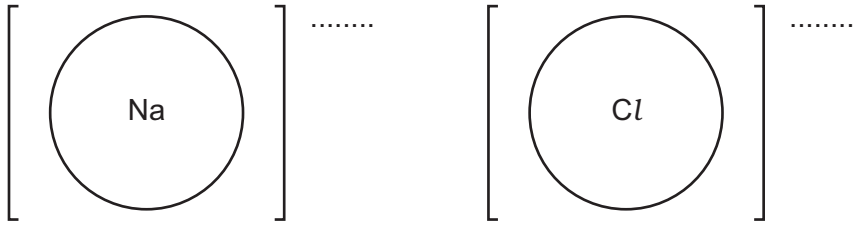


Figure 4.3

[3]

[Total: 9]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

5 **(a)** Table 5.1 shows information about some bases.

(i) Complete Table 5.1.

Table 5.1

name	formula	atoms in the formula
potassium hydroxide	KOH	1 potassium 1 oxygen 1 hydrogen
ammonium hydroxide	NH_4OH	
sodium hydrogencarbonate		1 sodium 1 hydrogen 1 carbon 3 oxygen

[2]

(ii) Explain why some bases are **not** alkalis.

.....

..... [1]

(b) **(i)** Bases react with acids.

Complete the equation to show the general products formed when a base reacts with an acid.

base + acid → ..... [1]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(ii) Explain why increasing the temperature of the reactants increases the rate of a reaction.

Use collision theory in your answer.

.....

.....

.....

.....

.....

..... [3]

[Total: 7]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

6 The list shows four fractions obtained from petroleum.

bitumen

diesel oil

naphtha

refinery gas

(a) Each fraction contains molecules of different chain length.

Place these fractions in order of increasing chain length.

shortest chain length ⟶ longest chain length

....

[2]

(b) Figure 6.1 shows the structure of a hydrocarbon obtained from petroleum.

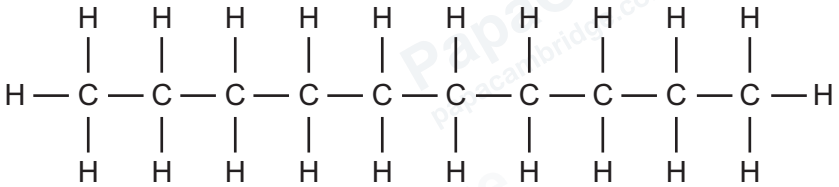


Figure 6.1

(i) Deduce the molecular formula for this hydrocarbon.

..... [1]

(ii) The hydrocarbon in Figure 6.1 is a member of a homologous series.

Name this homologous series.

..... [1]

DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(iii) The hydrocarbon shown in Figure 6.1 is used to make smaller hydrocarbons by cracking, as shown in Figure 6.2.

Complete Figure 6.2.

- State the conditions required for cracking.
- Draw the structure of the second product, include all of the atoms and all of the bonds.

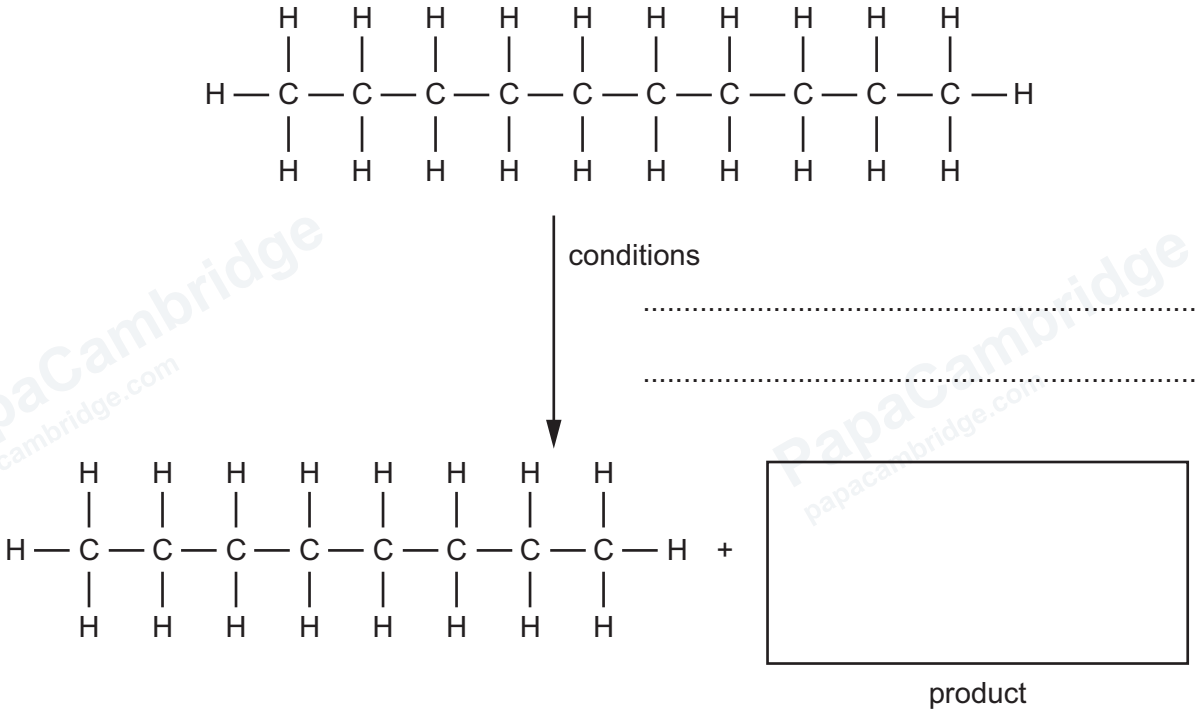


Figure 6.2

[3]

(c) Diesel oil contains sulfur.

(i) The complete combustion of diesel oil forms carbon dioxide.

Name **one** other air pollutant formed by the complete combustion of diesel oil.

..... [1]

(ii) Higher concentrations of carbon dioxide in the air lead to increased global warming.

State **two** strategies to reduce the concentration of carbon dioxide in the air.

1 .....

.....

2 .....

.....

[2]

[Total: 10]

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

7 **(a)** **(i)** State the region of the electromagnetic spectrum used for communication with mobile (cell) phones.

..... [1]

(ii) State **one** example of:

a transverse wave .....

a longitudinal wave. .....
[2]

(b) The distance from the Earth to the Moon is 3.85×10^5 km.

(i) The orbital period of the Moon around the Earth is 27.3 days.

Calculate the orbital speed of the Moon around the Earth in km / h.

orbital speed = ... km / h [2]

(ii) A ray of red light from a laser is aimed at the Moon. The ray is reflected back to Earth by mirrors on the Moon.

Calculate the time taken for the light to travel to the Moon and back to the Earth.

time = ... s [2]

[Total: 7]

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

Turn over

PapaCambridge
papacambridge.com

GradeMax

8 Figure 8.1 shows a dinosaur called a tyrannosaur.

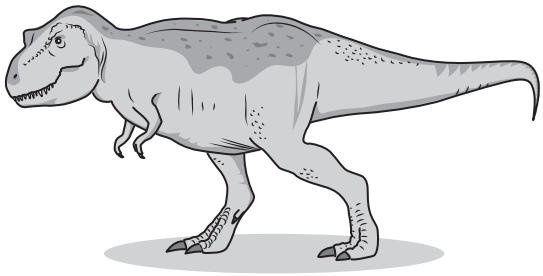


Figure 8.1

The mass of the tyrannosaur is 6500 kg.

(a) (i) Show that the weight of the tyrannosaur is 64 000 N.

[1]

(ii) The tyrannosaur stands on two feet without moving.

Each foot has an area of 0.65 m^2.

Calculate the pressure exerted on the ground by the tyrannosaur.

State the unit of your answer.

pressure = ... unit ..... [4]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

GradeMax

(b) The tyrannosaur walks at an initial constant speed of 1.0 m / s.

The tyrannosaur then accelerates with constant acceleration for a time of 15 s.

The kinetic energy of the tyrannosaur at its final speed is 52 000 J.

Determine the acceleration of the tyrannosaur.

acceleration = ... m/s^2 [5]

[Total: 10]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

9 Figure 9.1 shows an electric kettle connected to a mains plug socket.

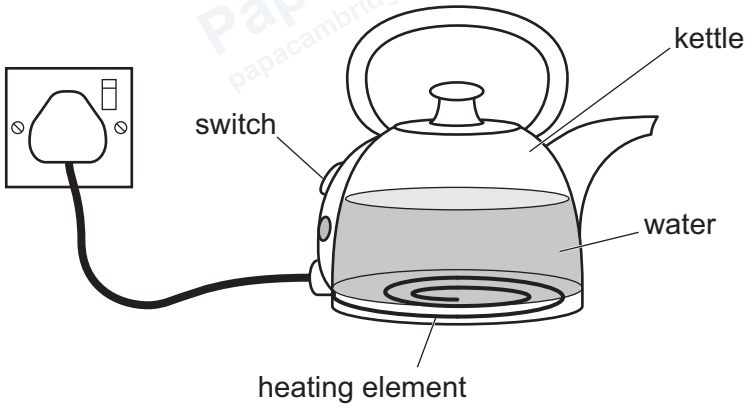


Figure 9.1

The kettle is switched on.

(a) Describe how thermal energy is transferred from the heating element to the water.

Use ideas about particles in your answer.

.....

.....

.....

..... [2]

(b) The kettle has a power rating of 2.2 kW.

(i) The kettle takes 5.0 minutes to heat the water to boiling point.

The energy required to heat the water to boiling point is 610 kJ.

Calculate the efficiency of the kettle.

efficiency = ...% [4]

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

GradeMax

(ii) The heating element in the kettle consists of two heaters connected in parallel.

State **one** advantage of connecting the heaters in parallel compared with connecting the heaters in series.

.....

..... [1]

(iii) Figure 9.2 shows the circuit diagram for the kettle connected to the mains supply voltage of 230 V.

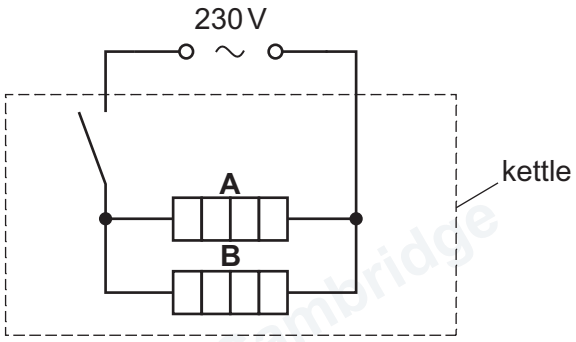


Figure 9.2

The kettle is switched on. The power transferred by the kettle is 2.2 kW. The current in heater **A** is 4.2 A.

Calculate the resistance of heater **B**.

resistance = ... Ω [3]

[Total: 10]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (Cambridge University Press & Assessment) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in our Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge International Education is the name of our awarding body and a part of Cambridge University Press & Assessment, which is a department of the University of Cambridge.

© Cambridge University Press & Assessment 2026

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

© Cambridge University Press & Assessment 2026

The Periodic Table of Elements

Group I	Group II											Group III	Group IV	Group V	Group VI	Group VII	Group VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

Key

atomic number
atomic symbol
name
relative atomic mass

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 dm^3 at room temperature and pressure (r.t.p.).

DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN DO NOT WRITE IN THIS MARGIN

GradeMax