THIS IS A LEGACY SPECIFICATION

OCR
RECOGNISING ACHIEVEMENT

F

Tuesday 24 January 2012 – Morning

GCSE GATEWAY SCIENCE
SCIENCE B

B621/01 Unit 1 Modules B1 C1 P1 (Foundation Tier)

Candidates answer on the Question Paper.
A calculator may be used for this paper.

OCR supplied materials:
None

Other materials required:
- Pencil
- Ruler (cm/mm)

Duration: 1 hour

Candidate forename		Candidate surname	

Centre number						Candidate number				

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes above. Please write clearly and in capital letters.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- Read each question carefully. Make sure you know what you have to do before starting your answer.
- Write your answer to each question in the space provided. Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- A list of physics equations is printed on page two.
- The Periodic Table is printed on the back page.
- The total number of marks for this paper is **60**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

$$\text{efficiency} = \frac{\text{useful energy output}}{\text{total energy input}}$$

wave speed = frequency × wavelength

power = voltage × current

energy (kilowatt hours) = power (kW) × time (h)

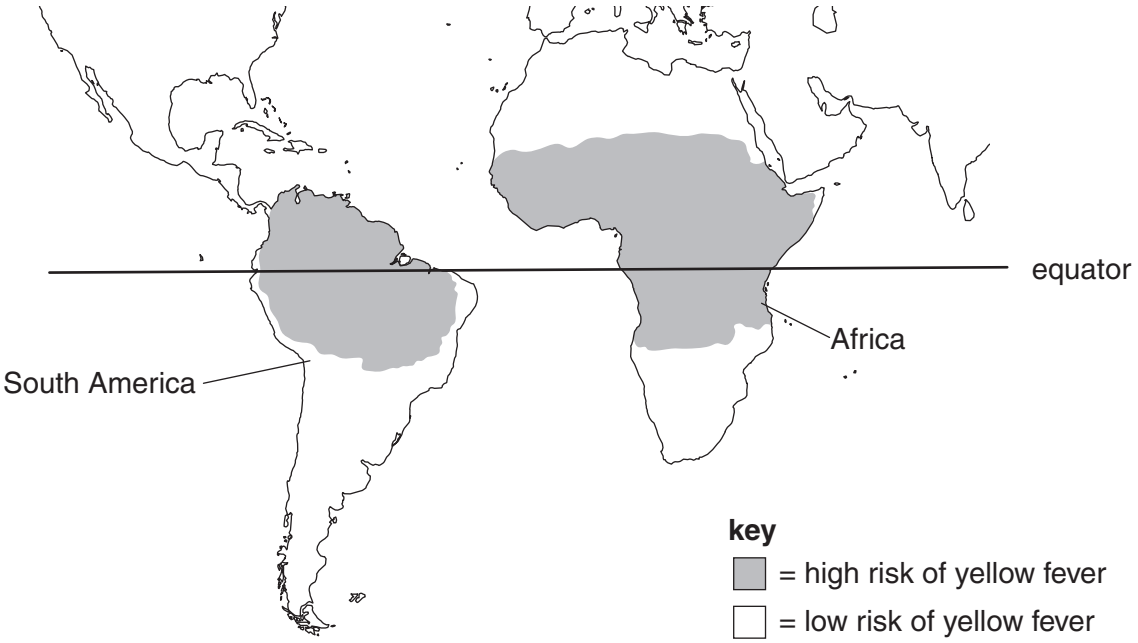
Answer **all** the questions.

Section A – Module B1

1 Geoff is going to Africa.

Yellow fever is a disease which only occurs in South America and Africa.

The map shows areas where people get yellow fever in South America and Africa.



(a) What does the map show about where people get yellow fever in South America and Africa?

.....

..... **[1]**

(b) Yellow fever is caused by a virus.

Finish the table by writing in the cause of two other conditions.

Choose your answers from this list.

bacteria **fungi** **inherited genes** **protozoa**

condition	cause
cystic fibrosis	
athlete's foot	

[2]

[Total: 3]

2 **(a)** In some places in the world people live at high altitude.

These people are often good athletes.

This is because their bodies are very good at getting oxygen from the air.

Scientists have been studying why this is.

The scientists studied

- each athlete's pulse rate
- how much haemoglobin was in their blood
- how much iron was in their diet.

(i) Describe how the scientists could measure pulse rate.

.....

.....

..... **[2]**

(ii) The amount of iron in the diet might affect the amount of haemoglobin in the blood.

Suggest why.

.....

..... **[1]**

(b) **(i)** Some athletes take drugs to try to improve their performance.

Which type of drug is most likely to improve an athlete's performance?

Put a (ring) around the correct answer.

anabolic steroids **aspirin** **LSD** **temazepam**

[1]

(ii) Stimulants can help an athlete run faster.

They do this by increasing the breathing rate and pulse rate.

Explain how these changes may help the athlete run faster.

.....

.....

.....

..... **[3]**

(c) When athletes run, their bodies generate more heat.

Write down **one** change in their bodies that lets them lose more heat.

..... **[1]**

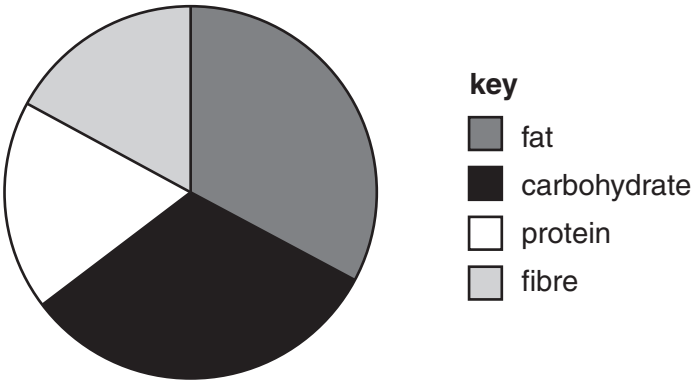
[Total: 8]

3 Four people go on four different diets.

The table shows each person's daily intake when they are on their diets.

person	energy in kJ	fat in g	carbohydrate in g	protein in g	fibre in g
Jilly	5406	120	16	62	16
Arthur	3570	12	154	32	62
Gazza	4692	78	76	44	40
Aqsa	5134	102	30	68	18

(a) The pie chart shows one person's diet.



Which person's diet is shown on the pie chart?

..... **[1]**

(b) Which person's diet would be best for preventing constipation?

..... **[1]**

(c) Arthur's diet is the **least** suitable for a growing teenager.

Write down **one** reason why.

..... **[1]**

(d) Jilly has a body mass of 80 kg.

(i) Calculate Jilly's recommended daily average (RDA) protein intake.

Use the formula below to help you.

$$\text{RDA in g} = 0.75 \times \text{body mass in kg}$$

Jilly's RDA = ... g **[1]**

(ii) Does Jilly's diet provide her with enough protein?

answer .....

Explain your answer.

..... **[1]**

[Total: 5]

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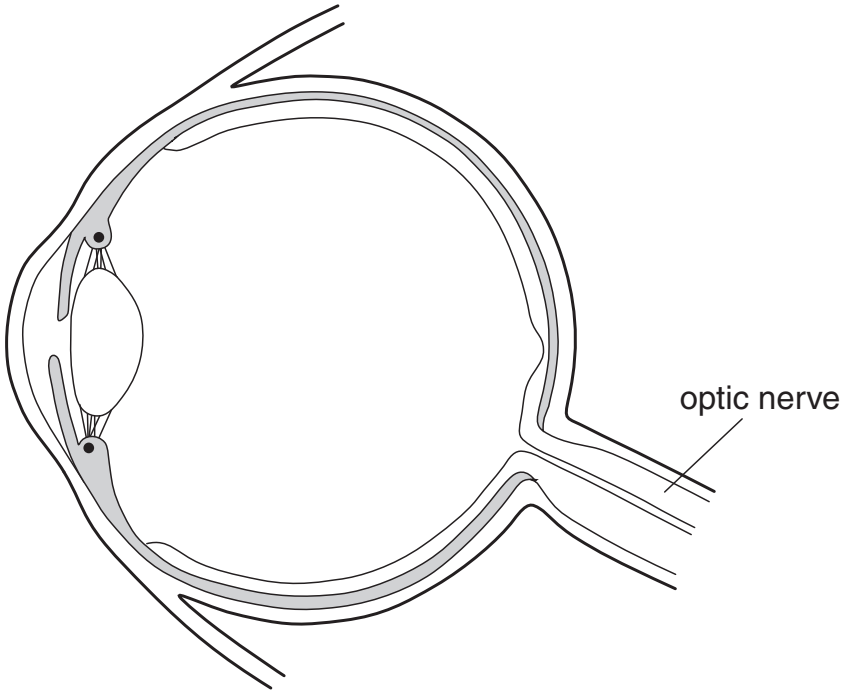
4 Look at the diagram of the eye.



(a) The optic nerve has been labelled.

Add **two** more labels to the diagram to show the positions of the

- lens
- cornea.

[2]

(b) Some people have problems with their eyes.

These problems are caused by something wrong in the eyes.

Finish the table.

eye problem	what is wrong in the eyes
long-sight	
red-green colour blindness	

[2]

[Total: 4]

Section B – Module C1

5 Crude oil is used to make many substances.

(a) Crude oil is a fossil fuel.

Fossil fuels are non-renewable.

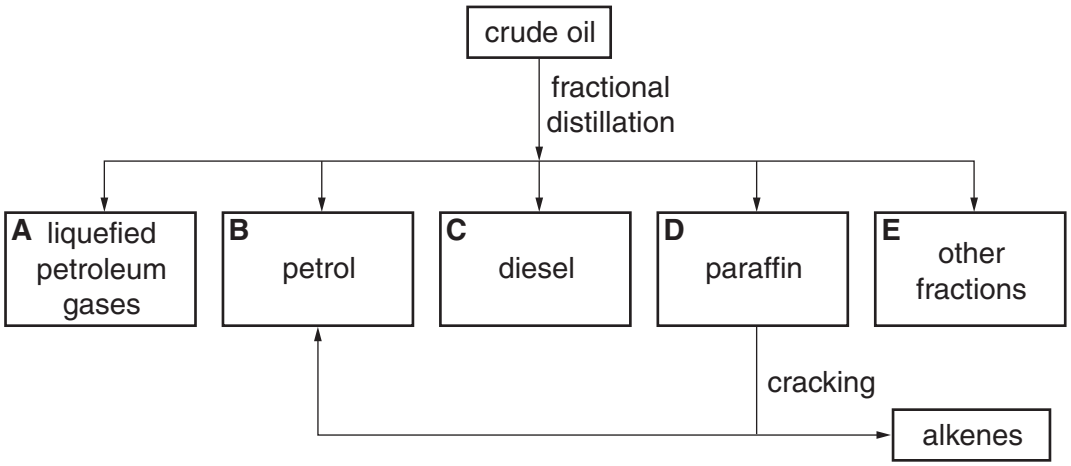
Explain why.

.....

..... **[1]**

(b) Look at the flow chart.

It shows some of the substances that can be made from crude oil.



(i) Fractional distillation separates crude oil into fractions.

Write down the name of one of the other fractions.

Choose from

bitumen **carbohydrate** **coal** **nylon**

answer ..... **[1]**

(ii) Cracking breaks down large hydrocarbon molecules.

Smaller, more useful molecules are made.

Write down **one** substance made by cracking the paraffin fraction.

..... **[1]**

(c) Each fraction contains hydrocarbon molecules.

Look at the table.

fraction	number of carbon atoms in each hydrocarbon molecule	boiling temperature in °C
liquefied petroleum gases (LPG)	1–4	below 30
petrol	5–9	30–175
paraffin	10–16	176–275
diesel	12–25	276–375

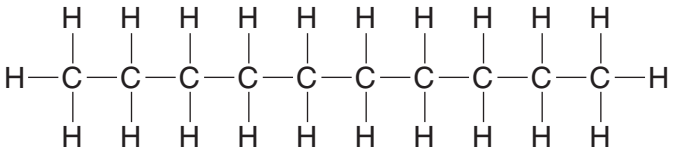
(i) A hydrocarbon has a boiling temperature of 189 °C.

In which fraction is this hydrocarbon found?

Choose from the table.

answer ..... **[1]**

(ii) Look at the displayed formula for hydrocarbon **X**.



Write down the names of the **two** elements which are bonded together in a hydrocarbon.

..... and ..... **[1]**

(iii) In which fraction is hydrocarbon **X** found?

Choose from the table.

answer ..... **[1]**

[Total: 6]

6 Aircraft use a hydrocarbon fuel to power their jet engines.

(a) A gas in the air reacts with the fuel when it burns.

Which gas?

..... **[1]**

(b) The owners of the aircraft want to change the fuel the engines burn.

Two of the factors the owners need to think about are

- the energy released per kilogram
- the cost.

Write down two **other** factors the owners need to think about.

1.....

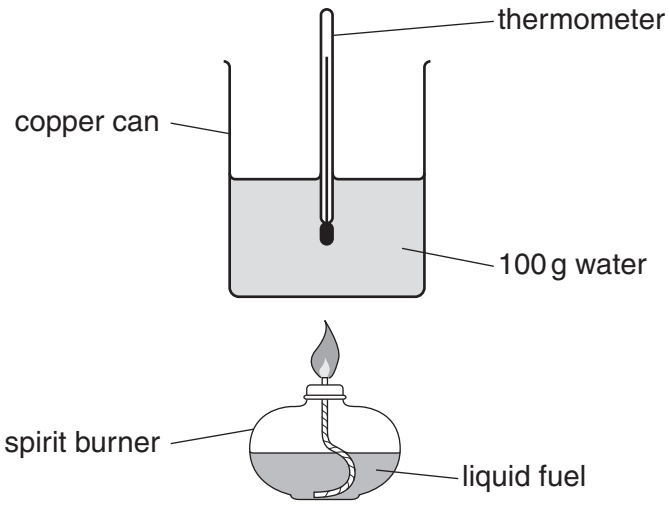
.....

2.....

..... **[2]**

(c) Cristina wants to compare the energy released by four different liquid fuels.

Look at the diagram of the apparatus she uses.



Each time she burns 2.0 grams of the liquid fuel.

She measures the temperature of the water at the start.

She measures the temperature again when all the fuel has burnt.

Look at her results.

fuel	temperature of water at start in °C	temperature of water at end in °C
A	20	46
B	18	46
C	21	47
D	23	39

(i) Which fuel releases the most energy?

fuel .....

Explain your answer. .....

..... **[2]**

(ii) Cristina notices that all the fuels burn with a yellow flame and make lots of soot.

Suggest why.

..... **[1]**

[Total: 6]

7 Many foods and drinks contain food additives.

Look at the bottle of mayonnaise.

The mayonnaise contains some food additives.

One of these additives is benzoic acid.

(a) Benzoic acid has the molecular formula $C_7H_6O_2$.

How many atoms are there in one molecule of benzoic acid, $C_7H_6O_2$?

Choose from

3

6

8

9

13

15

17

answer ..... **[1]**

(b) The mayonnaise contains an **antioxidant**.

What is the job of an antioxidant?

.....

..... **[1]**

(c) The mayonnaise contains oil and water.

It also contains an **emulsifier**.

(i) Why is it important that mayonnaise contains an emulsifier?

.....

..... **[1]**

(ii) Write down the name of **another** food that contains an emulsifier.

..... **[1]**

(d) The mayonnaise bottle is made of a plastic.

Two properties of this plastic are

- it will not break when dropped
- it is non-biodegradable.

(i) Write down one **other** property of the plastic that makes it suitable to make the bottle for the mayonnaise.

.....

..... **[1]**

(ii) What does **non-biodegradable** mean?

.....

..... **[1]**

(iii) Many plastic bottles are thrown away in dustbins.

Write about the different ways of disposing of waste plastics (polymers).

.....

.....

.....

..... **[2]**

[Total: 8]

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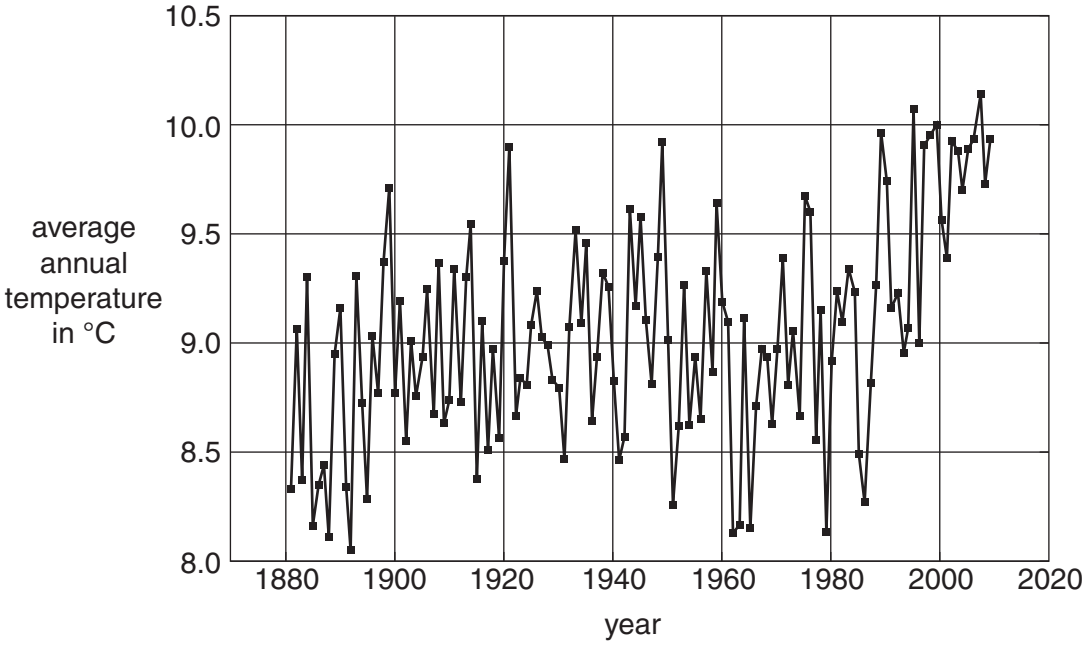
Section C – Module P1

8 Look at the graph.

It shows the average annual temperature recorded at one weather station.



(a) The graph suggests that the temperature of the Earth has increased during the last 20 years.

Suggest **two** reasons why the Earth's temperature has increased.

1 .....

2 ..... **[2]**

(b) Natural phenomena and human activity can affect weather patterns.

(i) Dust from a large volcano spreads as a layer around the Earth.

How will this affect the Earth's temperature?

.....

..... **[1]**

(ii) Dust from a town centre factory can raise the temperature of the town.

Explain why.

.....

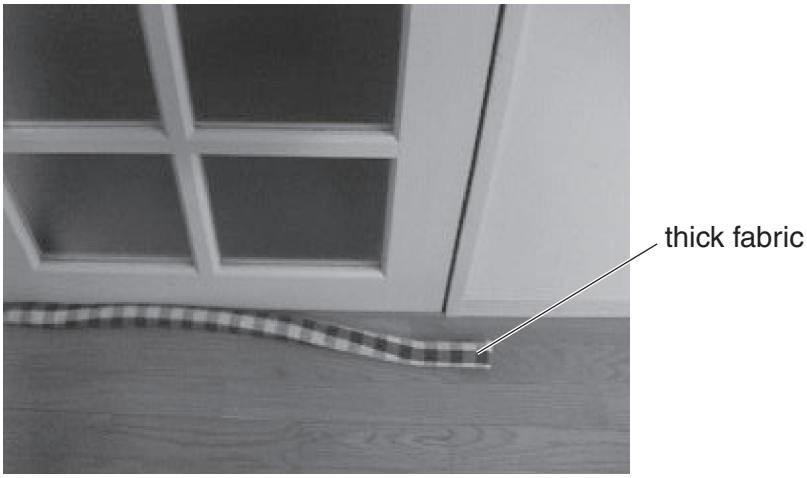
..... **[1]**

[Total: 4]

9 This question is about ways of reducing energy loss from the home.

(a) Tina puts a length of thick fabric at the bottom of her dining room door.

It helps to keep the room warm.



How does the thick fabric reduce energy loss?

Put a tick (✓) in the box next to the correct answer.

It absorbs energy from the room and radiates it back into the room.	☐
It is a form of draught proofing and reduces the amount of cold air that can enter the room.	☐
It reduces energy loss by conduction because the fabric is a good conductor.	☐
It reduces energy loss by radiation because it reflects energy back into the room.	☐

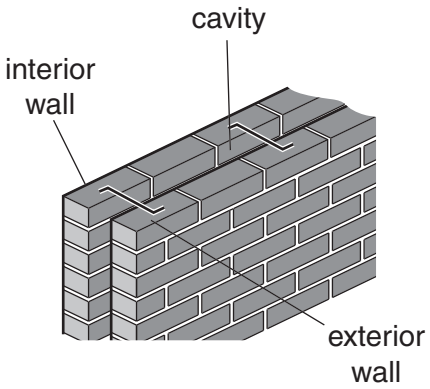
[1]

(b) The room has thick curtains and blinds which reduce energy loss through the windows.

Suggest one **other** way of reducing energy loss through the windows.

..... **[1]**

(c) The diagram shows the cavity between the outer and inner walls of Tina's home.



The cavity is filled with air.

(i) What happens to the air in the cavity when its temperature rises?

..... **[1]**

(ii) Tina investigates ways of insulating her home.

She finds the following information.

insulation	installation cost in £	payback time in years
cavity wall insulation	250	2
double glazing	5000	50
draught proofing	100	4
loft insulation	250	1.7

She decides to buy **cavity wall insulation**.

Foam is injected into the wall cavity.

How much will she save on energy bills each year?

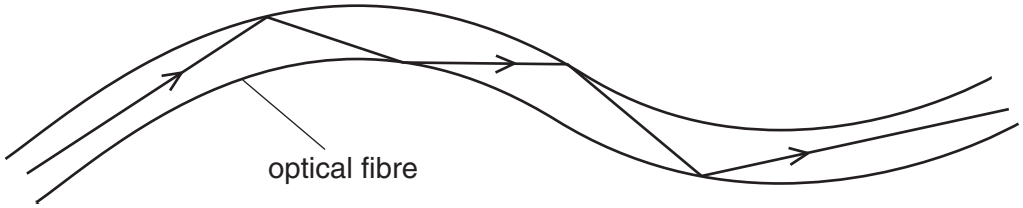
.....

.....

answer £ ..... **[1]**

[Total: 4]

10 Sam uses infrared radiation to transmit a voice message along an optical fibre.



(a) What happens to the infrared radiation in the fibre when it reaches a glass-air boundary?

..... **[1]**

(b) Infrared radiation travels at a particular speed in space.

What else travels at the same speed as infrared radiation?

Put (rings) around the **two** correct answers.

light waves

p waves

radio waves

sound waves

s waves

[2]

(c) The voice message is produced as an **analogue** signal.

It is changed into a **digital** signal before it is transmitted along the optical fibre.

Finish the sentences to describe the difference between an analogue signal and a digital signal.

An analogue signal .....

..... .

A digital signal .....

..... . **[2]**

(d) Suggest **one other** use for infrared radiation.

..... **[1]**

[Total: 6]

11 Microwave radiation is used to transmit mobile phone signals.

(a) One frequency used by mobile phones is 900 000 000 Hz.

The wavelength of the radiation is 0.333 m.

Calculate the speed of microwave radiation.

The equations on page 2 may help you.

.....

.....

.....

answer ..... m/s **[1]**

(b) Write down **one other** use for microwave radiation in the home.

..... **[1]**

(c) Some scientists think that using mobile phones a lot may harm children's health.

Suggest why they are worried that using mobile phones may harm children's health.

.....

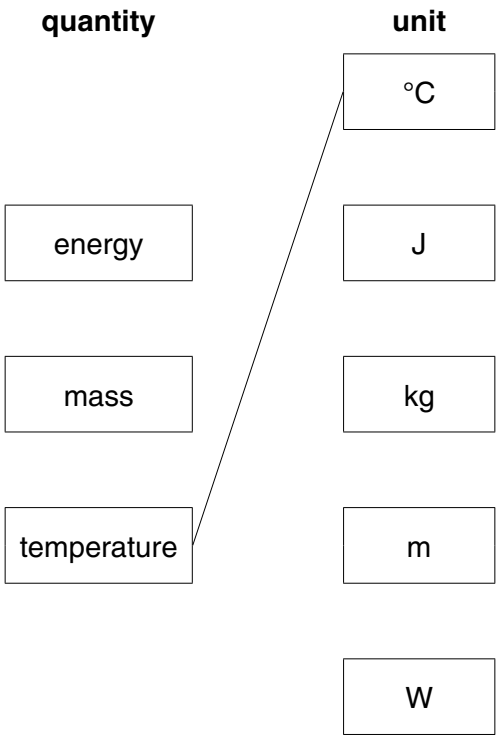
.....

..... **[2]**

[Total: 4]

12 Most physical quantities have their own unit.

Draw a straight line from each **quantity** to its correct **unit**. One has been done for you.



[2]

[Total: 2]

END OF QUESTION PAPER

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The Periodic Table of the Elements

1	2											3	4	5	6	7	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** 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	63.5 **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	[98] **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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.***

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.