

GENERAL CERTIFICATE OF SECONDARY EDUCATION
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.

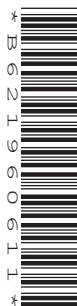
OCR supplied materials:
None

Other materials required:

- Pencil
- Ruler (cm/mm)

Friday 27 May 2011
Morning

Duration: 1 hour



Candidate forename		Candidate surname	
Centre number		Candidate number	

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. Pencil may be used for graphs and diagrams only.
- 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).
- Answer **all** the questions.
- 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 **28** pages. Any blank pages are indicated.

2

EQUATIONS

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

$$\text{wave speed} = \text{frequency} \times \text{wavelength}$$

$$\text{power} = \text{voltage} \times \text{current}$$

$$\text{energy (kilowatt hours)} = \text{power (kW)} \times \text{time (h)}$$

3

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Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

4

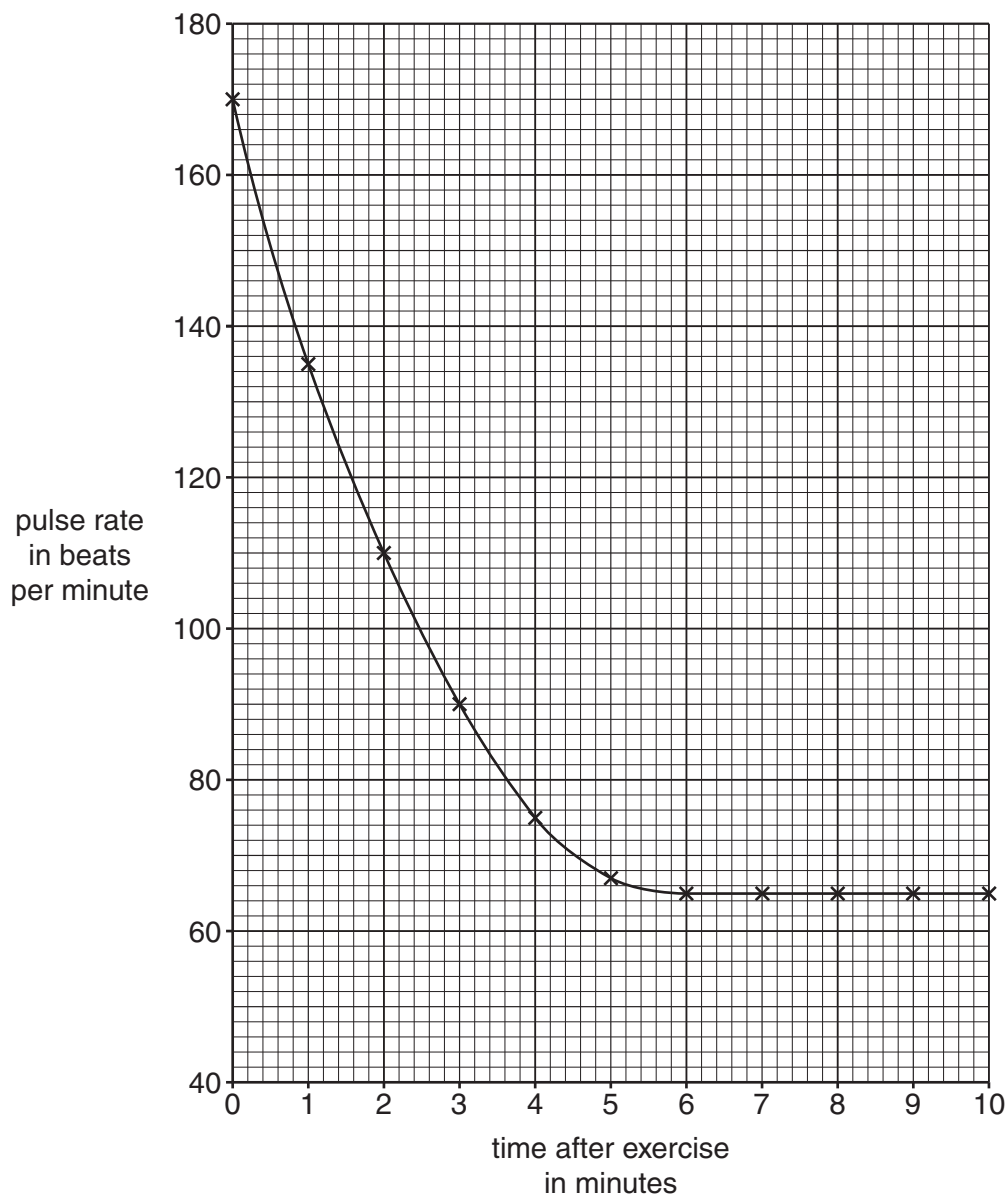
Answer **all** the questions.**Section A – Module B1**

1 Jo investigates her pulse rate.

She exercises by running across the school playing field.

She then sits down and measures her pulse rate every minute for 10 minutes.

The graph shows her results.



(a) Use the graph to answer the questions.

(i) What is Jo's lowest pulse rate?

..... beats per minute

[1]

5

- (ii) After exercise, Jo's pulse rate returns to its lowest value.

How long after her exercise does it take for Jo's pulse rate to return to its lowest value?

..... minutes [1]

- (b) Complete the sentences about what happens when Jo exercises.

When Jo exercises, her pulse rate increases to get more to her muscles.

Her pulse rate also increases to remove more from her muscles. [2]

- (c) (i) Jo wants to measure her body temperature before she exercises.

What should she use to measure her temperature?

..... [1]

- (ii) Jo's body temperature **before** she exercises is 37 °C.

What is Jo's body temperature **during** exercise?

Put a (ring) around the **best** answer.

31 °C

34 °C

37 °C

40 °C

43 °C

[1]

- (iii) When she exercises, Jo starts to sweat.

Why does Jo need to sweat?

.....

..... [1]

[Total: 7]

- 2 (a) Sam has red-green colour blindness.

This means that he **cannot** tell the difference between red and green colours.

- (i) Red-green colour blindness is an inherited disorder.

Look at the list.

Put a tick (✓) in the box next to another inherited disorder.

athlete's foot	☐
cholera	☐
cystic fibrosis	☐
dysentery	☐
flu	☐

[1]

- (ii) In which part of a cell would you find the gene for red-green colour blindness?

..... [1]

- (iii) Red-green colour blindness is the result of **changes** to genes.

Write down the scientific word for a change to a gene.

..... [1]

- (iv) Sam has an **identical** twin called Todd.

Todd has the same genes as Sam.

What is the probability that Todd also has red-green colour blindness?

Put a ring around the correct answer.

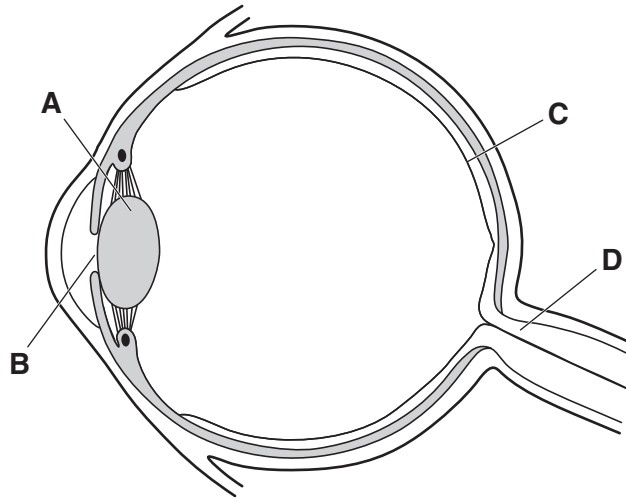
0% 25% 50% 100%

[1]

7

- (v) Red-green colour blindness is caused by a lack of special cells in the retina.

Look at the diagram of an eye.



Which part is the retina?

Choose from **A**, **B**, **C** or **D**.

answer

[1]

- (b) Vision can also be affected by drinking alcohol.

- (i) Alcohol slows down brain activity.

Write down the name of the **type** of drug that slows down brain activity.

..... [1]

- (ii) What effect does drinking a lot of alcohol have on vision?

.....

..... [1]

[Total: 7]

8

- 3 (a) Dalia lives in a part of Africa where there are food shortages.

She has not eaten enough **protein**.



- (i) What is the name of Dalia's condition?

Put a ring around the correct answer.

constipation

diabetes

kwashiorkor

obesity

scurvy

[1]

- (ii) The recommended daily amount of protein (RDA) can be calculated using the formula:

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

Dalia's friend Nia has a body mass of 40 kg.

Calculate Nia's RDA of protein.

.....

answer g

[1]

- (iii) Nia's body mass is greater than Dalia's.

Nia eats more meat and fish.

Protein from meat and fish is called **first class protein**.

Why is it called first class protein?

.....
 [1]

9

(b) Malaria is a common disease in the part of Africa where Dalia and Nia live.

Describe how malaria is spread.

In your answer include

- what causes malaria
- how it is spread from one person to another.

.....

.....

.....

.....

..... [3]

[Total: 6]

Section B – Module C1

4 This question is about food.

(a) Apples are eaten raw.

Potatoes are cooked before they are eaten.



One of the reasons potatoes are cooked is to improve their texture.

Write down two **other** reasons why potatoes are cooked before they are eaten.

1

2 [2]

(b) How does the **texture** of a potato change when it is cooked?

..... [1]

(c) Jean bakes a cake.



Jean's cake does not rise.

Which ingredient did Jean forget to put in her cake mixture?

Choose from the list.

baking powder

butter

flour

sugar

answer [1]

[Total: 4]

12

- 5 Paul collects his shirts from the dry cleaners.

They are wrapped in a plastic bag.



- (a) Answer the following questions using words from the list.

nylon

polyester

poly(ethene)

poly(propene)

polystyrene

- (i) Write down the name of the polymer most often used to make plastic bags.

..... [1]

- (ii) Write down the names of **two** polymers used to make shirts.

..... and [1]

13

(b) Look at the information about polymers **A**, **B**, **C** and **D**.

polymer	melting point in °C	easy to mould?	easily coloured?	stiff or flexible?
A	250	no	yes	stiff
B	98	yes	no	flexible
C	240	yes	no	flexible
D	160	yes	yes	stiff

Which polymer would be best for making a washing-up bowl?

.....

Explain your choice.

.....

..... [1]

(c) Complete the following sentences about making polymers.

Polymers are made when many small molecules called join together.

The reaction that makes polymers is called [2]

[Total: 5]

6 This question is about hydrocarbon fuels.

Look at the table.

It shows information about four gases which can be used as fuels.

gas	molecular formula	displayed formula
methane	CH ₄	$\begin{array}{c} \text{H} \\ \\ \text{H}-\text{C}-\text{H} \\ \\ \text{H} \end{array}$
ethane	C ₂ H ₆	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{H} \\ \quad \\ \text{H} \quad \text{H} \end{array}$
propane		$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \end{array}$
butane	C ₄ H ₁₀	$\begin{array}{c} \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \\ \quad \quad \quad \\ \text{H}-\text{C}-\text{C}-\text{C}-\text{C}-\text{H} \\ \quad \quad \quad \\ \text{H} \quad \text{H} \quad \text{H} \quad \text{H} \end{array}$

(a) What is the total number of **atoms** in one molecule of butane?

..... [1]

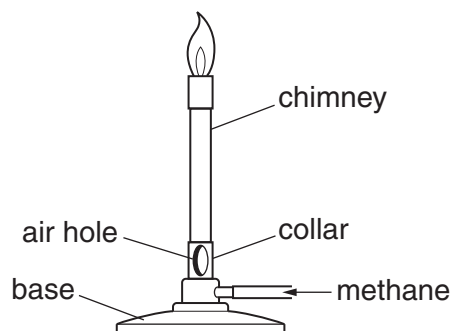
(b) What is the **molecular** formula for propane?

Write your answer in the table.

[1]

15

(c) A Bunsen burner uses methane.



Carolyn heats 100g of water for 3 minutes. She uses a blue flame.

She works out that the temperature rise of the water is 54°C .

Carolyn does the experiment again. This time she uses a yellow flame.

Look at her results.

Bunsen flame	temperature of water before heating in $^{\circ}\text{C}$	temperature of water after heating in $^{\circ}\text{C}$	temperature rise in $^{\circ}\text{C}$
blue	15	69	54
yellow	15	41	

(i) Complete the table.

[1]

(ii) When the air hole is open the flame is blue.

When the air hole is closed the flame is yellow.

It is better to heat the beaker of water using a blue flame instead of a yellow flame.

Write down **two** reasons why.

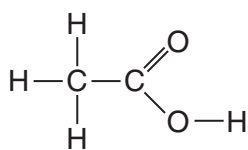
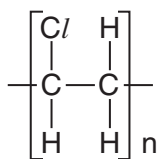
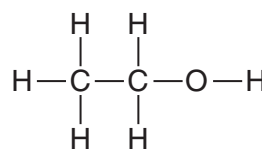
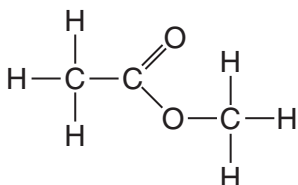
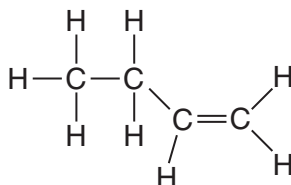
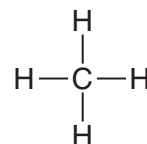
.....

.....

..... [2]

[Total: 5]

7 Look at the displayed formulas.

compound **A**compound **B**compound **C**compound **D**compound **E**compound **F**

(a) (i) Which compound is a **polymer**?

Choose from **A**, **B**, **C**, **D**, **E** or **F**.

answer [1]

(ii) Compound **F** is a **hydrocarbon**.

Which other compound is also a hydrocarbon?

Choose from **A**, **B**, **C**, **D** or **E**.

answer [1]

(b) Compound **D** is an **ester**.

(i) Complete the sentence about making an ester.

Alcohols react with to make esters and water. [1]

(ii) Perfumes can be made from synthetic esters.

Perfumes can also be made using esters from natural sources.

Write down one example of a **natural** source of perfume.

..... [1]

(iii) We are able to smell perfume.

What happens in our nose when we smell perfume?

..... [1]

17

(iv) Perfumes must be carefully tested before they are sold.

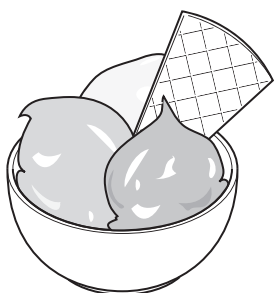
Write down **one** reason why.

..... [1]

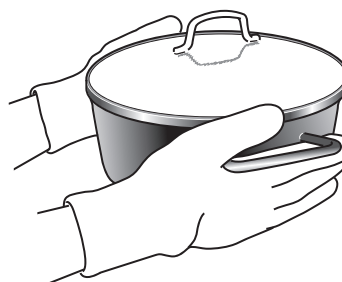
[Total: 6]

Section C – Module P1

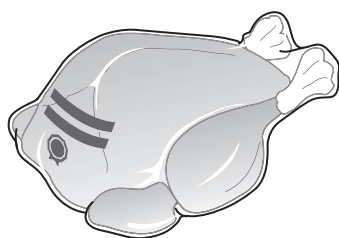
- 8 (a) Look at the pictures of four objects in Clare's home.



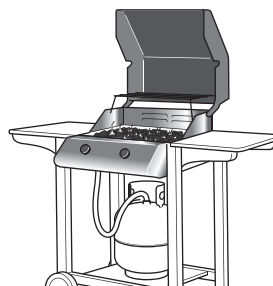
ice cream
-3 °C



pan
200 °C



chicken
-20 °C



gas barbeque
400 °C

- (i) Which object has the **highest** temperature?

Choose from

ice cream

pan

chicken

gas barbeque

answer..... [1]

19

(ii) Clare turns the barbeque off.

She takes all four objects into the garden.

The temperature of the air is 22 °C.

Which **two** objects will cool down?

Choose from

ice cream

pan

chicken

gas barbeque

answer..... and [2]

(b) Clare takes a hot potato out of the oven.

She wraps the potato in shiny foil.

This shiny foil keeps the potato hot for a long time.

Explain why.

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

[Total: 4]

- 9 Ellie has a mobile phone. She calls her friend who lives in France.



- (a) What type of signal does a mobile phone use for phone calls?

Choose from

infrared

light wave

microwave

ultraviolet

answer [1]

- (b) Ellie has photos on her mobile phone.

Ellie wants to put one of the photos onto her laptop.

Look at the picture.



Some mobile phones use radio waves to transfer data.

Ellie's phone uses **another** type of signal to do this.

What type of signal does Ellie's mobile phone use to transfer photos?

Choose from

infrared

light wave

microwave

ultraviolet

answer [1]

21

- (c) Ellie uses her mobile phone a lot.

Her mum is worried about it damaging Ellie's health.

Write down **one** possible health risk of using a mobile phone.

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

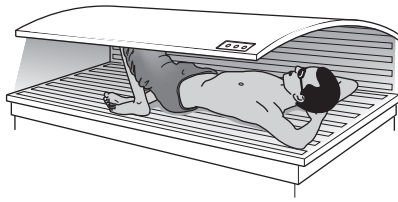
- (d) Wireless technology does not use wires.

Write down two **other advantages** of wireless technology.

1.....
2..... [2]

[Total: 5]

10 Sun beds give out ultraviolet radiation.



(a) Adam uses the sun bed too much.

This can be harmful.

Describe **two** ways that ultraviolet radiation can harm Adam.

.....

.....

.....

..... [2]

23

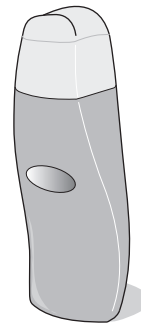
(b) Jake likes to lie in the sun.



He has two types of sun block.



low SPF
(low sun protection factor)



high SPF
(high sun protection factor)

Jake should use the **high** SPF sun block.

Explain why.

.....

.....

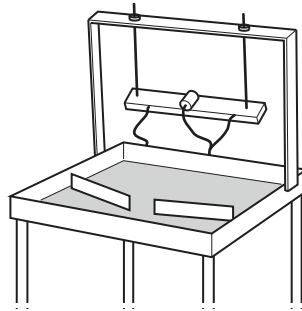
.....

..... [2]

[Total: 4]

- 11 Mrs Powers teaches her class about waves.

She shows them some water waves in a ripple tank.



- (a) The water waves have a frequency of 3 Hz.

What does **frequency** mean?

.....
 [1]

- (b) The class measures the water waves.

The waves have a frequency of 3 Hz.

Their wavelength is 0.04 m.

Calculate the **speed** of the waves.

The equations on page 2 may help you.

.....

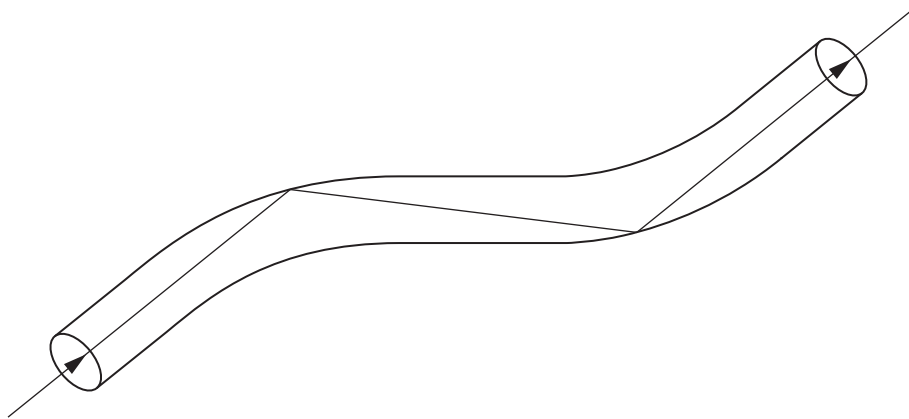
answer m/s [2]

[Total: 3]

25

12 Optical fibres can be used to communicate.

Look at the diagram of part of an optical fibre.



(a) Light travels along the optical fibre.

Complete the sentence.

Optical fibres use a process called total internal [1]

(b) Optical fibres normally carry **digital** rather than **analogue** signals.

Complete the sentences.

Digital signals can be either or

Analogue signals have a continuously

The light rays in the optical fibre carry data in of light. [3]

[Total: 4]

END OF QUESTION PAPER

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The Periodic Table of the Elements

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28

1	2	Key										3	4	5	6	7	0							
		relative atomic mass atomic symbol name atomic (proton) number																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													

28

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