

**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	
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Centre number						Candidate number				
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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. 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.

EQUATIONS

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

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

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

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

BLANK PAGE

Question 1 begins on page 4.

PLEASE DO NOT WRITE ON THIS PAGE

Answer **all** the questions.

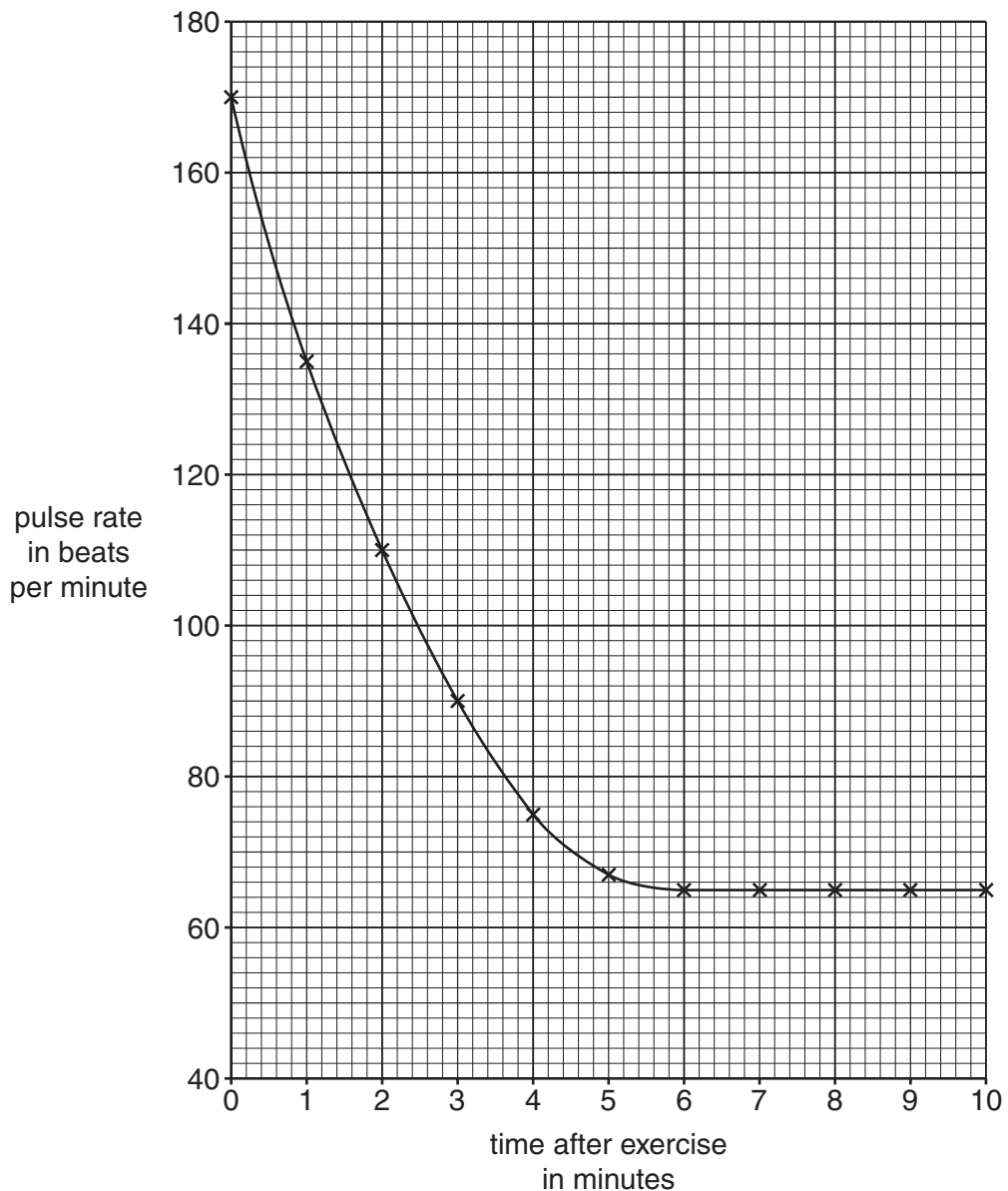
Section A – Module B1

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]

(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	<input type="checkbox"/>
cholera	<input type="checkbox"/>
cystic fibrosis	<input type="checkbox"/>
dysentery	<input type="checkbox"/>
flu	<input type="checkbox"/>

[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?

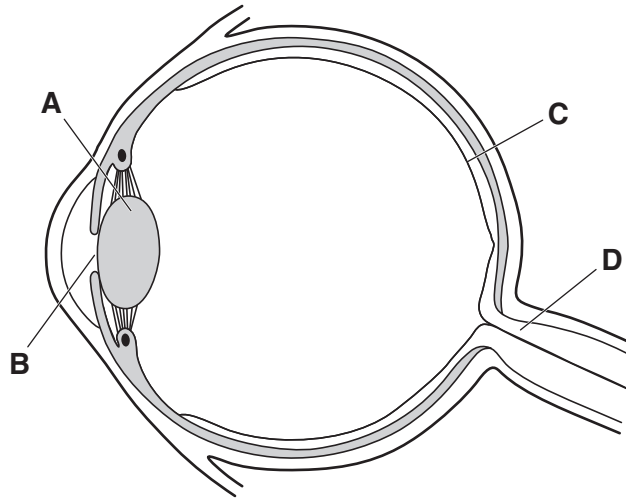
Put a ring around the correct answer.

0% 25% 50% 100%

[1]

(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]

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]

(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 can be eaten uncooked.

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]

5 Paul collects his shirts from the dry cleaners.

The shirts 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]

(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	<pre> H H - C - H H </pre>
ethane	C ₂ H ₆	<pre> H H H - C - C - H H H </pre>
propane		<pre> H H H H - C - C - C - H H H H </pre>
butane	C ₄ H ₁₀	<pre> H H H H H - C - C - C - C - H H H H H </pre>

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

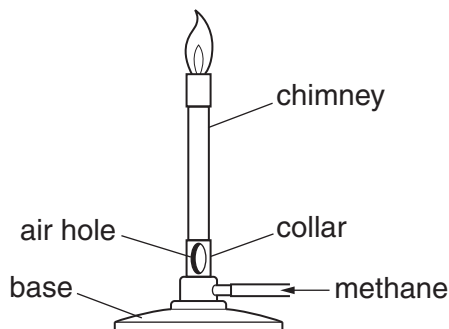
..... [1]

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

Write your answer in the table.

[1]

(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 °C	temperature of water after heating in °C	temperature rise in °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.

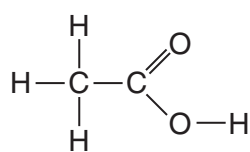
.....

.....

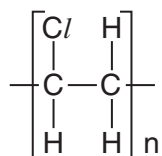
..... [2]

[Total: 5]

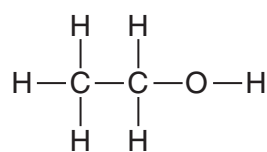
7 Look at the displayed formulas.



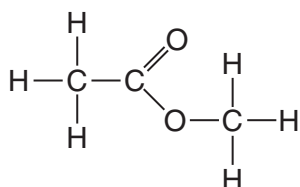
compound A



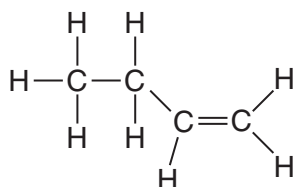
compound B



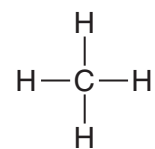
compound C



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]

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

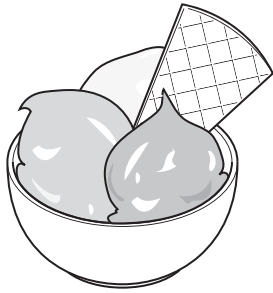
Write down **one** reason why.

..... [1]

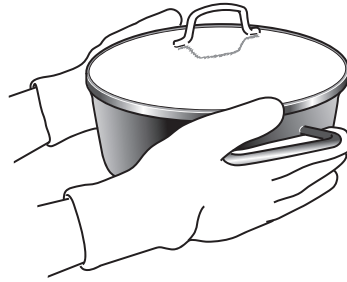
[Total: 6]

Section C – Module P1

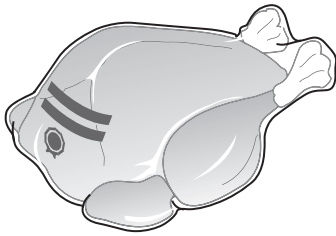
8 (a) Look at the pictures and temperatures of four objects in Clare's home.



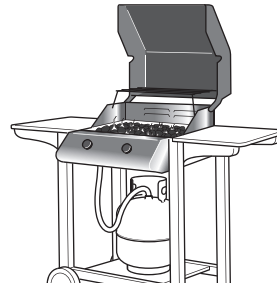
ice cream
-3 °C



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]

(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 phones 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

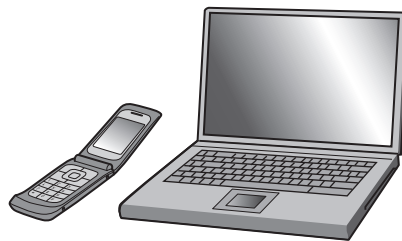
ultraviolet

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]

(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]

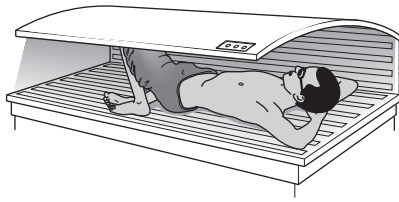
(d) Wireless technology does not use wires.

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]

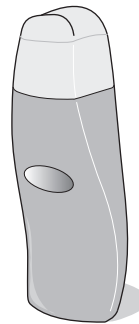
(b) Jake likes to lie in the sun.



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.

.....

.....

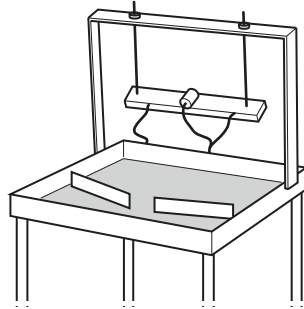
.....

..... [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 3Hz.

What does **frequency** mean?

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

(b) The class measures the water waves.

The waves have a frequency of 3Hz.

Their wavelength is 0.04m.

Calculate the **speed** of the waves.

The equations on page 2 may help you.

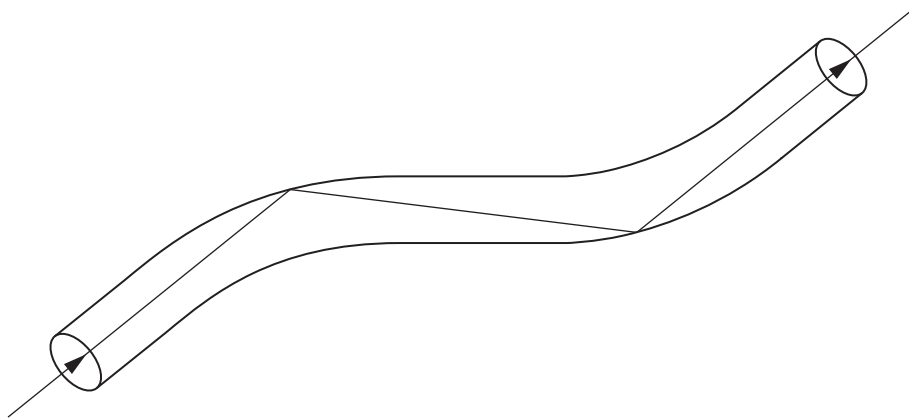
.....
.....

answer m/s [2]

[Total: 3]

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

1 2 3 4 5 6 7 0

		1		2		3		4		5		6		7		0																			
7	Li lithium 3	9	Be beryllium 4	11	Na sodium 11	12	Mg magnesium 12	13	Al aluminium 13	14	Si silicon 14	15	P phosphorus 15	16	S sulfur 16	17	Cl chlorine 17	18	Ar argon 18																
19	K potassium 19	20	Ca calcium 20	21	Sc scandium 21	22	Ti titanium 22	23	V vanadium 23	24	Cr chromium 24	25	Mn manganese 25	26	Fe iron 26	27	Co cobalt 27	28	Ni nickel 28	29	Cu copper 29	30	Zn zinc 30	31	Ga gallium 31	32	Ge germanium 32	33	As arsenic 33	34	Se selenium 34	35	Br bromine 35	36	Kr krypton 36
37	Rb rubidium 37	38	Sr strontium 38	39	Y yttrium 39	40	Zr zirconium 40	41	Nb niobium 41	42	Mo molybdenum 42	43	[98] Tc technetium 43	44	Ru ruthenium 44	45	Rh rhodium 45	46	Pd palladium 46	47	Ag silver 47	48	Cd cadmium 48	49	In indium 49	50	Sn tin 50	51	Sb antimony 51	52	Te tellurium 52	53	I iodine 53	54	Xe xenon 54
55	Cs caesium 55	56	Ba barium 56	57	La* lanthanum 57	58	Hf hafnium 58	59	Ta tantalum 59	60	W tungsten 60	61	Re rhenium 61	62	Os osmium 62	63	Ir iridium 63	64	Pt platinum 64	65	Au gold 65	66	Hg mercury 66	67	Tl thallium 67	68	Pb lead 68	69	Bi bismuth 69	70	Po polonium 70	71	At astatine 71	72	Rn radon 72
[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

1 H
hydrogen
1

4 He
helium
2

* 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