OCR
RECOGNISING ACHIEVEMENT

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GENERAL CERTIFICATE OF SECONDARY EDUCATION **B621/01**

GATEWAY SCIENCE

SCIENCE B

Unit 1 Modules B1 C1 P1 (Foundation Tier)

THURSDAY 5 JUNE 2008

Morning
Time: 1 hour

CUP/T52442

Candidates answer on the question paper.
Additional materials (enclosed):
None

Calculators may be used.
Additional materials: Pencil
Ruler (cm/mm)

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

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

FOR EXAMINER'S USE		
Section	**Max.**	**Mark**
A	**20**	
B	**20**	
C	**20**	
TOTAL	**60**	

This document consists of **22** printed pages and **2** blank pages.

[Turn over

EQUATIONS

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

wave speed = frequency $\times$ wavelength

power = voltage $\times$ current

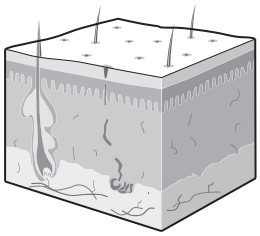
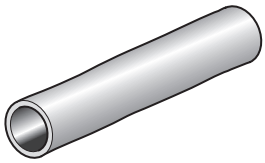
energy (kilowatt hours) = power (kW) $\times$ time (h)

Answer **all** the questions.

Section A – Module B1

1 Timothy is playing a card game.
He has two sets of cards.
One set has parts of the body on them.
Another set has jobs on them.

Draw straight lines to match each **body part card** with the correct **job card**.

body part card	job card
heart 	helps to control the temperature of the body
skin 	detects the balance of the body
artery 	pumps blood around the body
pancreas 	produces insulin
	carries blood around the body under pressure

[4]

[Total: 4]

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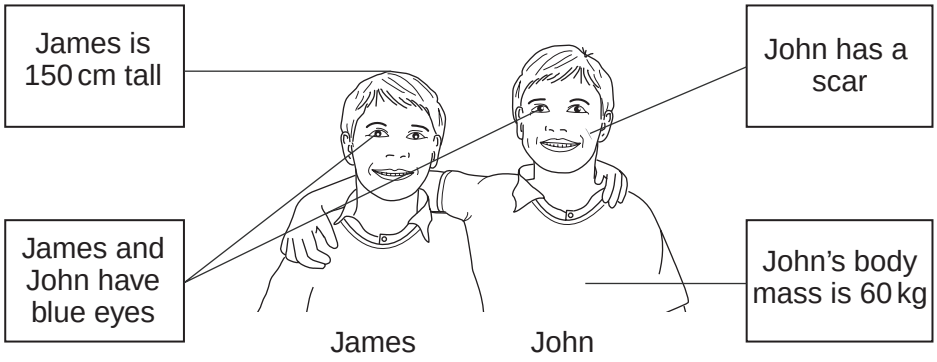
2 James and John are identical twins.
This means that they have inherited the same genes from their parents.
The diagram shows some of their characteristics.



(a) Write each of the characteristics from the diagram in the correct column in the table.

One has been done for you.

controlled by their genes	caused by the environment	controlled by their genes and the environment
		James is 150 cm tall

[3]

(b) Finish the sentences about James and Johns' genes.

Choose words from this list.

cytoplasm **DNA** **egg** **nucleus** **protein** **sugar**

James and John have the same genes.

Their genes are made of a chemical called ..... .

Their genes are found in the part of their cells called the ..... .

[2]

[Total: 5]

3 Karen sees a chart in a magazine.
The chart can be used to calculate the percentage of alcohol in her blood after she drinks some alcoholic drinks.

	percentage of alcohol in the blood								
body mass in kg \ units of alcohol drunk	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
50	.04	.08	.11	.15	.19	.23	.26	.30	.34
60	.03	.06	.09	.12	.16	.19	.22	.25	.28
70	.03	.05	.08	.11	.13	.16	.19	.21	.24
80	.02	.05	.07	.09	.12	.14	.16	.19	.21
90	.02	.04	.06	.08	.11	.13	.15	.17	.19
100	.02	.04	.06	.08	.09	.11	.13	.15	.17
110	.02	.03	.05	.07	.09	.10	.12	.14	.15
120	.02	.03	.05	.06	.08	.09	.11	.13	.14

□ = below legal driving limit ■ = above legal driving limit

A single measure of spirits  or a half pint of beer  contains 1 unit of alcohol.

(a) Karen drinks the following:



a single measure of spirits a half pint of beer a pint of beer

(i) Work out the number of units that Karen has drunk.

answer ..... units [1]

(ii) Karen has a body mass of 90 kg.

Use the chart to find the percentage of alcohol in Karen's blood after drinking these drinks.

answer ..... % [1]

(b) Karen's friend Belinda has also been drinking alcohol.

The percentage of alcohol in her blood is 0.13%.

Explain why it is now unsafe for Belinda to drive a car.

.....

.....[2]

[Total: 4]

4 Garry likes eating peanuts.

He looks on the back of his peanut packet.

He finds a list of some of the nutrients that are found in the peanuts.

100 g of peanuts contains:	
protein	7.4 g
carbohydrate	2.1 g
fat	15.9 g
fibre	1.8 g

(a) Use nutrients from the list to answer these questions.

(i) Write down the nutrient that is used for growth and repair.

.....[1]

(ii) Write down the nutrient that may prevent constipation.

.....[1]

(b) When Garry eats the peanuts, they are digested in his digestive system.

(i) What is meant by the word **digestion**?

.....

.....[1]

(ii) Finish the sentences about how fat is digested in Garry's digestive system.

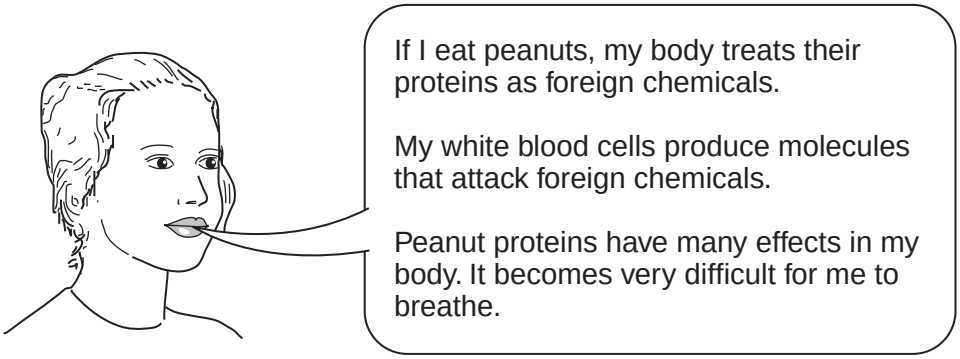
Fat digestion starts in the ..... .

This is caused by the enzyme ..... .

[2]

(c) Garry has a friend Julie.

Julie is allergic to peanuts which makes her ill if she eats them.



Write down scientific words that mean the same as these words in Julie's description.

Choose your scientific words from this list.

acids **antibiotics** **antibodies** **antigens**

(i) the foreign chemicals .....

(ii) the molecules that attack foreign chemicals .....

[2]

[Total: 7]

Section B – Module C1

5 Some foods contain additives.

Look at the table. It gives some information about E numbers.

type of food additive	E number range
food colour	E101 to E199
preservative	E200 to E299
antioxidant	E300 to E321
emulsifiers and stabilisers	E322 and E400 to E499
sweeteners	E950 to E967

Look at the list of **ingredients** of a food.

Ingredients

Wheat flour, carrots, sultanas, yeast, sugar, salt, ascorbic acid, E160, sodium carbonate.

(a) What type of food additive is E160?

.....[1]

(b) Which ingredient is there in the **smallest** amount?

.....[1]

(c) Sodium benzoate is a preservative.

It has the formula $C_7H_5O_2Na$.

How many **different** elements are chemically joined in sodium benzoate?

answer .....[1]

(d) Antioxidants stop food from going 'off'.

They stop the food from reacting with a gas in the air.

Which gas?

.....[1]

(e) Emulsifiers help oil and water to mix.

Write down the name of a food that contains an emulsifier.

Choose from the list.

lemonade

mayonnaise

orange squash

potato chips

answer .....[1]

[Total: 5]

6 Crude oil is a fossil fuel that is found in the Earth's crust.
It is pumped to the surface in an oil well.

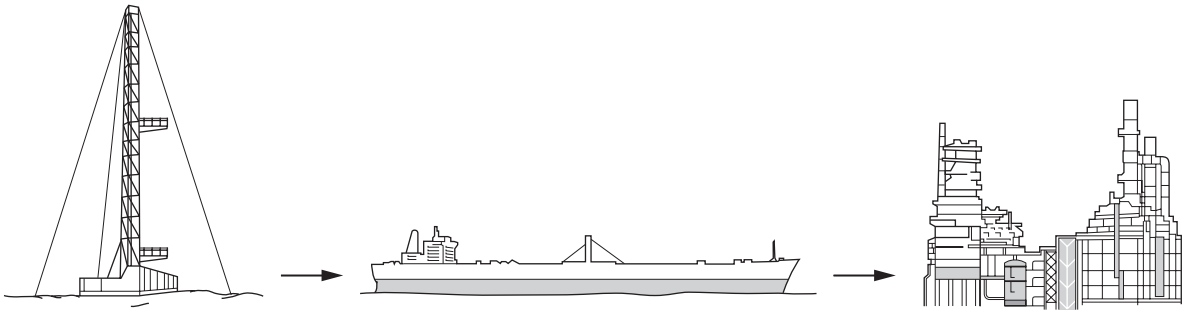
(a) Crude oil is a **non-renewable** fuel.

Explain why.

.....

.....[1]

(b) Look at the diagram. It shows how crude oil is transported from an oil well to a refinery.



oil well in the Middle East

oil tanker taking crude oil to the United Kingdom

oil refinery in the United Kingdom

(i) Crude oil is transported in a ship to oil refineries.
Sometimes these ships have accidents and crude oil spills out.
These spills make **oil slicks**.

Write about **one** environmental problem of oil slicks.

.....

.....[1]

(ii) One of the processes that happens in an oil refinery is **cracking**.

Look at the list of sentences about cracking.

Which sentences about cracking are correct?

Put ticks (✓) in the **two** boxes next to the correct sentences.

Cracking converts small molecules into large molecules. ☐

Cracking needs a catalyst and a high temperature. ☐

Cracking separates crude oil into fractions. ☐

Cracking is used at an oil refinery to make more petrol. ☐

Cracking works because different fractions have different boiling points. ☐

[2]

[Total: 4]

7 Polymers such as **poly(ethene)**, **polystyrene** and **nylon** have many uses.

(a) Lots of polystyrene is used in packaging electrical items.

(i) Write down **one** use of poly(ethene).

.....[1]

(ii) Write down **one** use of nylon.

.....[1]

(b) Getting rid of waste polystyrene is very difficult.
Most councils will not recycle polystyrene and so it goes into our rubbish bins.

Write about the problems of disposing of waste polystyrene.

Include in your answer

- the ways of getting rid of polystyrene
- the problems of waste polystyrene.

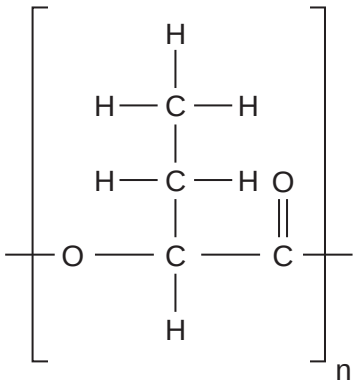
.....

.....

.....

.....[3]

(c) Look at the structure of a new polymer.
It is biodegradable.



This polymer is **not** a hydrocarbon.

Explain why.

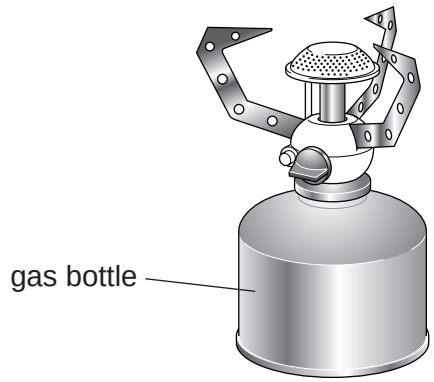
.....

.....[1]

[Total: 6]

8 This question is about fuels and combustion.

(a) Look at the diagram of a camping stove.



A fuel is stored in the gas bottle.

Many factors need to be considered when choosing a fuel for this camping stove.

One factor is whether the fuel is expensive or not.

Write down **two** other factors that need to be considered.

1 .....

2 .....[2]

(b) Some camping stoves use propane, C_3H_8, as a fuel.

Complete combustion happens when propane burns in lots of air.

Complete combustion of propane makes **two** substances.

Which two substances?

Choose from the list.

carbon

carbon dioxide

hydrogen

nitrogen

oxygen

water

answer ..... and ..... [2]

(c) Carbon monoxide is made when propane burns in a shortage of air.

Put a tick (✓) in the box next to a problem caused by carbon monoxide.

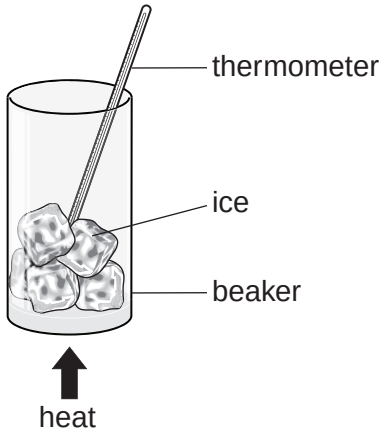
acid rain	☐
ozone depletion	☐
photochemical smog	☐
poisonous to humans	☐

[1]

[Total: 5]

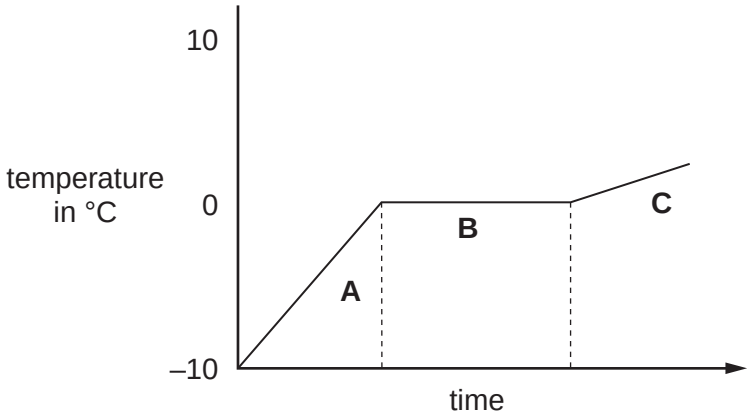
Section C – Module P1

9 Dave collects some ice from the freezer.



He heats the ice with a Bunsen burner and measures the temperature.

Look at the graph of his results.



(a) (i) When is the temperature rising fastest?

Choose from the list.

A B C

..... [1]

(ii) When is the ice melting?

Choose from the list.

A B C

..... [1]

(b) Look at the energy statements **A**, **B**, **C** and **D** below.

A the energy needed to raise the temperature of 1 kg of ice by 1 °C

B the energy needed to heat ice

C the energy needed to melt 1 kg of ice

D the energy needed to cool ice

(i) Which letter describes the **specific latent heat** of ice?

Choose from the list.

A B C D

..... [1]

(ii) Which letter describes the **specific heat capacity** of ice?

Choose from the list.

A B C D

..... [1]

[Total: 4]

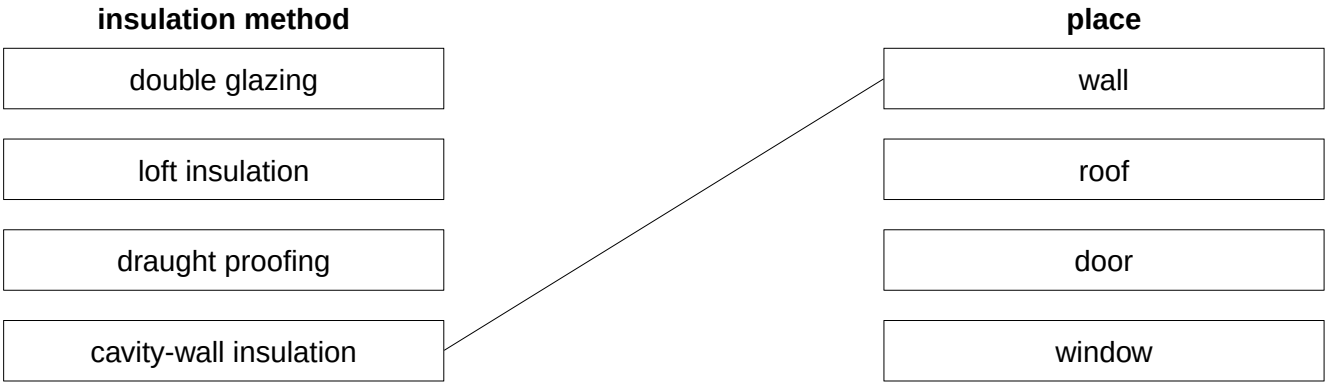
10 Sandra uses different insulation methods to insulate her house.

She fits cavity-wall insulation.

This reduces heat loss through the walls.

(a) Draw straight lines to connect the **insulation method** to the right **place**.

One line has been drawn for you.



[2]

(b) Look at the information about fitting insulation to Sandra's house.

insulation method	cost to fit in £	money saved each year in fuel bills in £	payback time in years
loft insulation	200	100	
double glazing		50	40
shiny foil behind radiators	5	10	0.5

(i) Calculate the payback time for loft insulation.

.....

answer ..... years [1]

(ii) How much did it cost Sandra to fit double glazing?

.....

answer £ ..... [1]

(iii) Sandra puts **shiny** foil behind her radiators to reduce her fuel bills.

How does the foil reduce her fuel bills?

.....

.....[2]

(iv) Loft insulation and double glazing contain air.

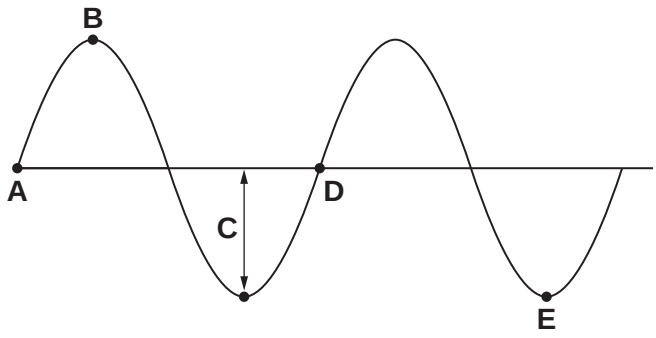
Why is **air** important?

.....[1]

[Total: 7]

11 This question is about waves.

Look at the diagram of a wave.



(a) Complete the sentences about the wave.

Choose from the list.

amplitude **crest** **frequency** **wavelength**

B is called the ..... .

The distance between **A and D** is called the ..... .

C is called the ..... . [3]

(b) Look at the list of waves.

microwaves

infrared

radio

ultraviolet

(i) Which wave is used in TV remote controls?

Choose from the list.

.....[1]

(ii) Which wave can cause skin cancer?

Choose from the list.

.....[1]

[Total: 5]

12 This question is about communication.

Mobile phones use wireless technology and microwaves.

(a) This **wireless** technology can be useful.

Suggest **two** reasons why.

1 .....

2 .....[2]

(b) These **microwave signals** may cause problems.

Suggest **two** problems.

1 .....

2 .....[2]

[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 **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.