

**GENERAL CERTIFICATE OF SECONDARY EDUCATION  
GATEWAY SCIENCE  
SCIENCE B**

**B621/01**

UNIT 1: Modules B1 C1 P1 (Foundation Tier)

**TUESDAY 15 JANUARY 2008**

Afternoon  
Time: 1 hour

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

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Candidate  
Number

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**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.
- Do **not** write outside the box bordering each page.
- 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	
<b>TOTAL</b>	<b>60</b>	

This document consists of **21** printed pages and **3** blank pages.

## 2

### EQUATIONS

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

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

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

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

Answer **all** the questions.

**Section A – Module B1**

1 Jermaine is worried that he may be ill.

He decides to measure his body temperature.



(a) Describe **how** he should measure his temperature.

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

(b) What is Jermaine’s **normal** body temperature at rest?

answer ..... °C [1]

(c) Jermaine’s body temperature is above normal.

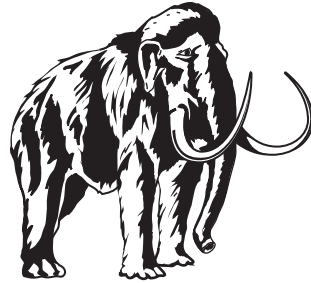
Write down **one** way that his body can change to increase heat loss.

..... [1]

[Total: 4]

2 This article appeared in a recent newspaper.

## Did some mammoths have blond hair?



Scientists have managed to extract **DNA** from the **cells** of a mammoth that has been dead for 43 000 years.

They have discovered a **gene** that codes for a **protein**.

This protein affects hair colour in humans and other animals.

The mammoth had two versions of the gene.

One is **dominant** and makes hair dark.

The other is **recessive** and makes hair blond.

Six words in the article are in **bold**.

The following are meanings of three of these words.

Write down the best word in the space next to its meaning.

(a) A chemical that makes up chromosomes .....

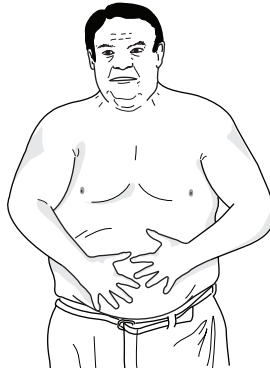
(b) A coded instruction containing a length of genetic code .....

(c) A chemical that is made up of amino acids .....

[3]

[Total: 3]

3 Barry thinks he might be very overweight.



(a) Write down **one** health risk Barry might face by being very overweight.

..... [1]

(b) Barry decides to go on a diet.

The chart shows the meals he eats in one day.

meal	contents	energy content in kJ	iron content in mg	vitamin C content in mg
breakfast	grapefruit and toast	1250	1.5	70
lunch	soup and a roll	1250	1.5	0
dinner	ham salad and ice cream	1500	2.0	5

(i) Which of Barry's meals contains the most iron?

..... [1]

(ii) Which of Barry's meals would be **best** to prevent scurvy?

..... [1]

(iii) Barry finds out that his recommended intake of energy is 10 000 kJ per day.

Work out what percentage of this he took in on this day.

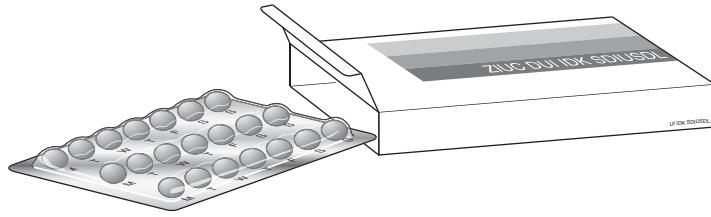
Put a **ring** around the correct answer in this list.

- 0.4%                      4%                      40%                      400%                      4000%

[1]

[Total: 4]

4 Contraceptive pills can be taken by women to prevent pregnancy.



(a) Write down the name of **one** hormone that is usually in female contraceptive pills.

..... [1]

(b) A new method of contraception is being produced by scientists.

It is given to men and stops the production of sperm.

The men are given an injection.

This makes the man's body produce antibodies.

The antibodies attack proteins needed for sperm production.

(i) Which system in the body is stimulated by the injection?

Put a ring around the correct answer in this list.

**digestive system**

**excretory system**

**immune system**

**respiratory system**

[1]

(ii) Write down the name of the cells that make antibodies.

..... [1]

(c) New treatments can be tested on animals before they are given to humans.

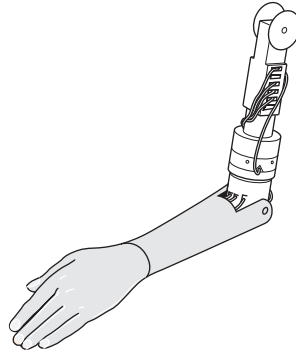
(i) Suggest why new treatments are sometimes tested on animals.

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

(ii) Write down **one** other way that treatments can be tested before human use **without** using live animals.

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

- 5 Claudia had a motor-cycle accident and had to have one of her arms removed. This arm has been replaced by an artificial arm.



Scientists have managed to reconnect Claudia's nerves to the artificial arm. Claudia can now control the movement of her artificial arm by thinking about it.

- (a) What type of signals pass along nerves?

Put a **ring** around the correct answer in this list.

**chemical reactions**

**electrical impulses**

**hormones**

[1]

- (b) The nerves to Claudia's arms are connected to her central nervous system (CNS).

Write down the name of **one** part of the CNS.

..... [1]

- (c) The nerves in Claudia's healthy arm contain different types of nerve cells (neurones).

Look at the list of neurones.

**motor neurone**

**relay neurone**

**sensory neurone**

Put a **ring** around the type of neurone that takes signals to Claudia's muscles.

[1]

- (d) Claudia touches a hot object with her artificial arm.

She does **not** automatically move her arm away.

Suggest why.

.....

..... [1]

[Total: 4]

**[Turn over**

## Section B – Module C1

6 Crude oil is a fossil fuel.

(a) Crude oil is separated at an oil refinery into useful parts.

These parts are called fractions.

(i) What is the name of the process that separates crude oil?

Choose from this list.

**decomposition**

**dissolving**

**fractional distillation**

**polymerisation**

answer .....[1]

(ii) Two of the substances in the list are fractions that can be separated from crude oil.

Which **two**?

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

carbon

diesel

nylon

petrol

polythene

[2]



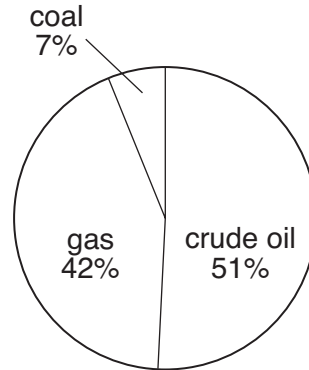
(b) Coal, crude oil and gas are non-renewable energy resources.

Supplies of these three fossil fuels will eventually run out.

Look at the information about fossil fuels.

percentage fossil fuel use in the UK in 2005

fossil fuel	number of years before the fuel runs out
coal	220
crude oil	40
gas	60



(i) Which fossil fuel will still be available in one hundred years' time?

..... [1]

(ii) Which fossil fuel was used the **least** in the UK in 2005?

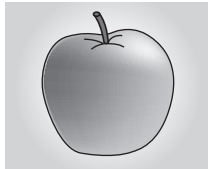
..... [1]

[Total: 5]

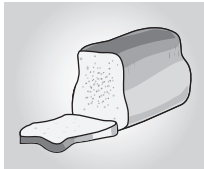
7 This question is about cooking and foods.

Look at the pictures of some foods.

apple



bread



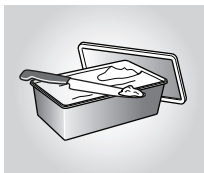
carrot



chicken



butter



fish



(a) Write down the name of **one** food that contains a lot of carbohydrate.

Choose from the foods in the pictures.

..... [1]

(b) Write down the name of **one** food that contains a lot of protein.

Choose from the foods in the pictures.

..... [1]

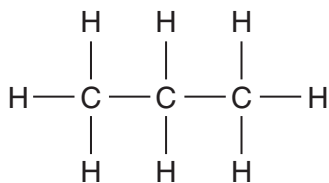
(c) Write about why we often cook fish before eating it.

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

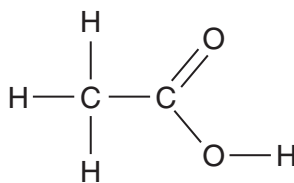
[Total: 4]

8 This question is about compounds that contain carbon.

Look at the displayed formulae.



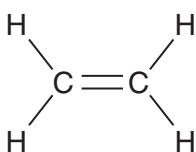
compound **A**



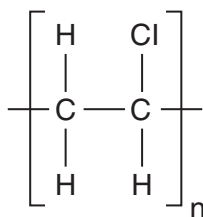
compound **B**



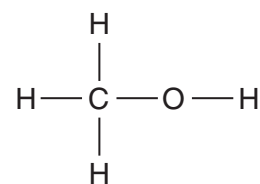
compound **C**



compound **D**



compound **E**



compound **F**

(a) Look at compound **A**.

How many **atoms** are there in one molecule of compound **A**?

..... [1]

(b) Look at compound **B**.

How many different **elements** are bonded together in compound **B**?

..... [1]

(c) Choose a compound which is a **hydrocarbon**.

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

..... [1]

(d) Which compound is an **alkene**?

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

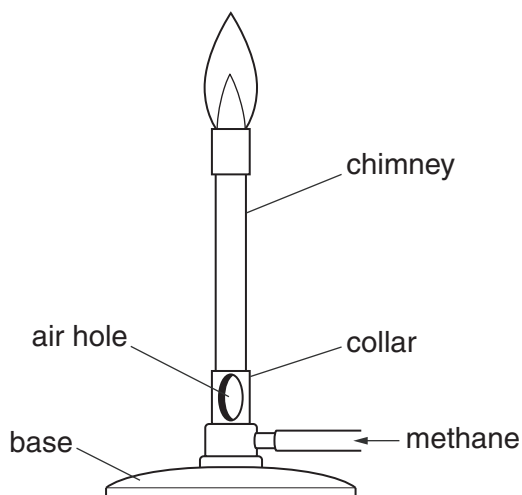
..... [1]

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

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

..... [1]

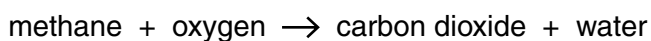
9 Callum is using a Bunsen burner.



He has the air hole open.

There is a blue flame.

In the flame the methane reacts with oxygen as shown in this word equation.



(a) What is the name of the gas needed for methane to burn?

..... [1]

(b) How can you tell from the word equation that complete combustion is happening?

..... [1]

(c) Callum closes the air hole of the Bunsen burner.

Incomplete combustion happens.

The flame changes colour from blue to yellow.

(i) A black solid is made.

What is the name of the black solid?

..... [1]

(ii) Carbon monoxide is made during incomplete combustion.

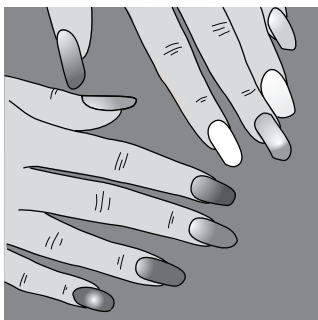
Carbon monoxide is a dangerous gas.

Why is it a dangerous gas?

..... [1]

[Total: 4]

10 Nail varnish remover is used to remove nail varnish.



Finish the sentences about nail varnish removers.

Choose words from this list.

**insoluble**

**soluble**

**solution**

**solvent**

Ethyl ethanoate is a nail varnish remover.

It is a ..... and dissolves nail varnish.

Water will not dissolve nail varnish.

This is because nail varnish is ..... in water.

[2]

[Total: 2]

Section C – Module P1

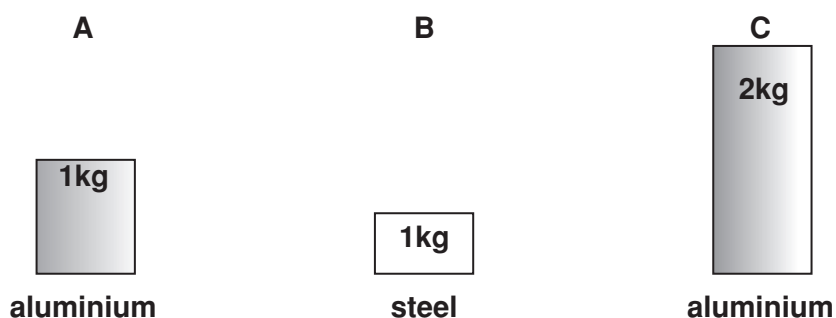
11 This question is about heat energy.

Rajvir wants to investigate how things heat up.

He uses three metal blocks.

They all start at the **same temperature**.

Block **A** and block **B** have a mass of 1 kg. Block **C** has a mass of 2 kg.



Rajvir heats the blocks for 5 minutes.

He uses **identical** heaters.

He measures the **final** temperature of each block.

Look at his table.

block	final temperature
<b>A</b>	60
<b>B</b>	100
<b>C</b>	40

(a) The **unit** of mass is the kilogram (kg). What is the unit of temperature?

Temperature is measured in ..... [1]

(b) (i) Why does block **B** reach a higher final temperature than block **A**?

..... [1]

(ii) Why does block **C** reach a lower final temperature than block **A**?

..... [1]

(c) Rajvir leaves the blocks for ten minutes.

The blocks cool down. They have lost heat by **conduction**, **convection** and **radiation**.

Rajvir's house loses heat in a similar way.

He reduces the heat loss through the **walls** of his house.

Complete the following sentences.

Choose from the list.

- air
- conduction**
- convection**
- foam
- radiation**
- water

Heat is lost through the brick walls of the house by .....

The **gap** between the inner and outer brick walls (the **cavity**) can be filled with

..... This reduces the heat loss across the gap by

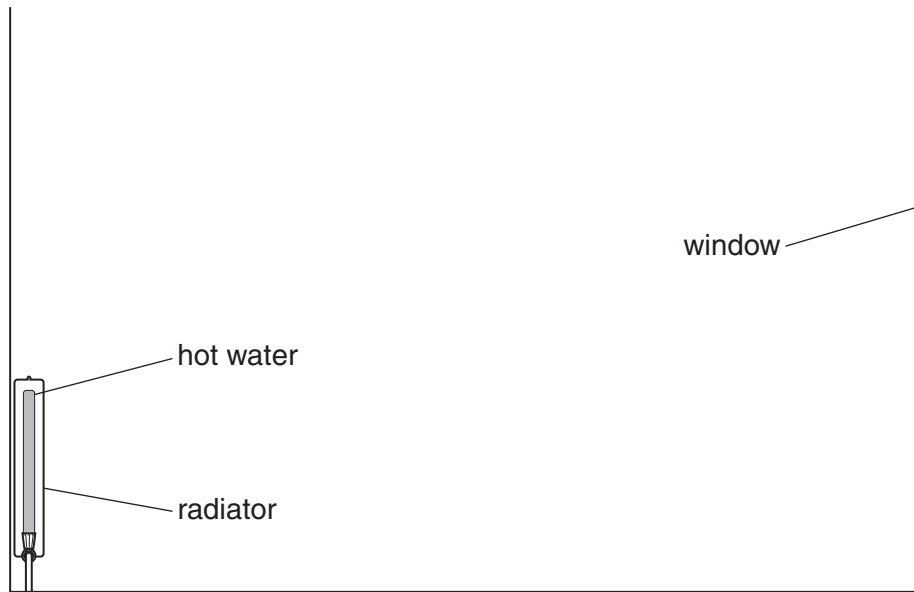
..... and .....

[2]

[Total: 5]

12 This question is about heat transfer and efficiency.

Tori has a radiator in her room.



The radiator is made of metal.

It has hot water inside it.

(a) Complete the following information about the radiator.

Choose from the list.

- conductors          joules          metal          room          water**

Radiators are made of metal because metals are good .....

Heat from the ..... is transferred through the

..... into the .....

The amount of heat energy entering the room is measured in .....

[3]

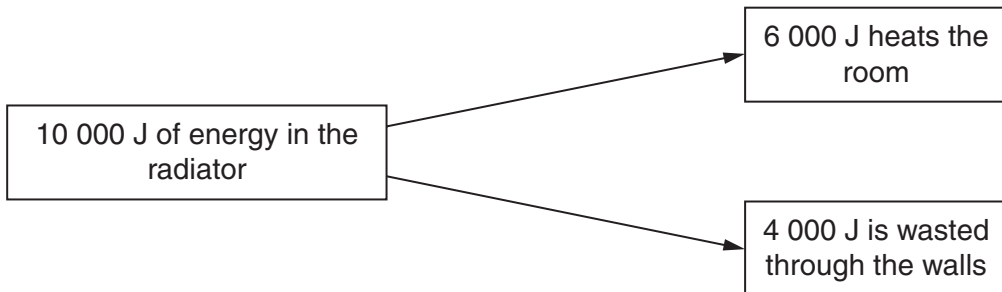


(b) Tori thinks that a lot of energy from the radiator is **wasted**.

She thinks the radiator has a low **efficiency**.

She finds this diagram in a book.

It shows how much energy is lost from a radiator.



Calculate the efficiency of the radiator in heating the room.

The list of equations on page 2 may help you.

.....

.....

.....

.....

efficiency = ..... %

[2]

[Total: 5]

13 This question is about wireless technology.



The router sends wireless signals to the laptop computer.

Wireless connections are used for home computers.

(a) Suggest **two** advantages of wireless connections.

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

(b) Radio signals can be either **analogue** or **digital**.

The number of radio programmes transmitted using digital signals has increased.

Put a **ring** around the most likely reason.

**analogue signals cannot carry information**

**digital signals can carry better quality information**

**sending digital signals is cheaper**

**analogue signals cannot be used for TV signals** [1]

(c) **Short** distance links for computers use an electromagnetic wave.

(i) Which electromagnetic wave is used?

Choose from the list

- infrared**
- light**
- ultraviolet**
- X-rays**

answer ..... [1]

(ii) Name **one** other use for this type of wave.

..... [1]

[Total: 5]

14 This question is about ultraviolet radiation from the Sun.

Megan knows that ultraviolet radiation can harm people.

(a) How is ultraviolet radiation dangerous to people?

..... [1]

(b) Megan wants to go outside on a sunny day.

She looks at these two sun creams.



**SPF** means **Sun Protection Factor**.

(i) Megan uses Golden Glow sun cream.

How long can Megan safely stay in the Sun?

Complete the table below.

safe time in the Sun for Megan	
without sun cream	with Golden Glow sun cream, SPF 15
5 minutes	

[1]

(ii) She decides that Bronze Blush will be better for her in the Sun.

Suggest why.

In your answer write about

- exposure times
- risk.

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

[Total: 5]

**END OF QUESTION PAPER**

20  
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21  
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# The Periodic Table of the Elements

1	2	3	4	5	6	7	0										
7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	11 <b>Na</b> sodium 11	12 <b>C</b> carbon 6	13 <b>Al</b> aluminium 13	14 <b>N</b> nitrogen 7	15 <b>P</b> phosphorus 15	16 <b>O</b> oxygen 8	17 <b>F</b> fluorine 9	18 <b>Ne</b> neon 10								
19 <b>K</b> potassium 19	20 <b>Ca</b> calcium 20	23 <b>Sc</b> scandium 21	24 <b>Ti</b> titanium 22	25 <b>V</b> vanadium 23	26 <b>Cr</b> chromium 24	27 <b>Mn</b> manganese 25	28 <b>Fe</b> iron 26	29 <b>Co</b> cobalt 27	30 <b>Ni</b> nickel 28	31 <b>Cu</b> copper 29	32 <b>Zn</b> zinc 30	33 <b>Ga</b> gallium 31	34 <b>Ge</b> germanium 32	35 <b>As</b> arsenic 33	36 <b>Se</b> selenium 34	37 <b>Br</b> bromine 35	38 <b>Kr</b> krypton 36
39 <b>Rb</b> rubidium 37	40 <b>Sr</b> strontium 38	45 <b>Y</b> yttrium 39	48 <b>Zr</b> zirconium 40	51 <b>Nb</b> niobium 41	52 <b>Mo</b> molybdenum 42	55 <b>Tc</b> technetium 43	56 <b>Ru</b> ruthenium 44	59 <b>Rh</b> rhodium 45	59 <b>Pd</b> palladium 46	65 <b>Cd</b> cadmium 48	70 <b>In</b> indium 49	73 <b>Sn</b> tin 50	75 <b>Sb</b> antimony 51	79 <b>Te</b> tellurium 52	80 <b>I</b> iodine 53	84 <b>Xe</b> xenon 54	86 <b>Rn</b> radon 86
55 <b>Cs</b> caesium 55	56 <b>Ba</b> barium 56	57 <b>La*</b> lanthanum 57	72 <b>Hf</b> hafnium 72	73 <b>Ta</b> tantalum 73	74 <b>W</b> tungsten 74	75 <b>Re</b> rhenium 75	76 <b>Os</b> osmium 76	77 <b>Ir</b> iridium 77	78 <b>Pt</b> platinum 78	79 <b>Au</b> gold 79	80 <b>Hg</b> mercury 80	81 <b>Tl</b> thallium 81	82 <b>Pb</b> lead 82	83 <b>Bi</b> bismuth 83	84 <b>Po</b> polonium 84	85 <b>At</b> astatine 85	86 <b>Rn</b> radon 86
[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[261] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1 <b>H</b> hydrogen 1
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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.