OCR
RECOGNISING ACHIEVEMENT

F

GENERAL CERTIFICATE OF SECONDARY EDUCATION

GATEWAY SCIENCE

B621/01

SCIENCE B

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)

Thursday 4 June 2009
Morning

Duration: 1 hour

Candidate Forename		Candidate Surname	

Centre Number						Candidate Number				

MODIFIED LANGUAGE

INSTRUCTIONS TO CANDIDATES

- Write your name clearly in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use 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, however additional paper may be used if necessary.

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

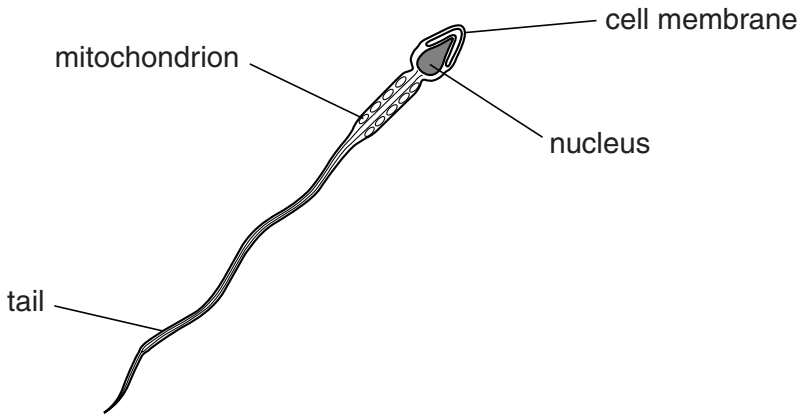
power = voltage × current

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

Answer **all** the questions.

Section A – Module B1

1 The diagram shows a sperm cell.



(a) Which part of the sperm cell contains chromosomes?

Choose from the labels on the diagram.

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

(b) Chromosomes contain genes.

What chemical are genes made from?

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

(c) Sperm cells swim to egg cells and they join together.

What is the name of the process when sperm cells and egg cells join together?

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

[Total: 3]

2 It is night time. Cathy walks into her house and puts the light on.

The bright light makes her pupils go smaller.

This happens very quickly.

The diagram shows Cathy's eyes **before** she puts the light on.

The diagram shows Cathy's eyes **after** she puts the light on.

(a) Cathy's pupils getting smaller is an example of a **reflex** action.

Write down **two** things which show that this is a reflex.

1 .....

.....

2 .....

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

(b) Information travels quickly along nerve cells during reflex actions.

In what form does the information travel?

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

(c) Cathy has green eyes.

How is the colour of Cathy's eyes controlled?

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

environment	☐
genes	☐
environment and genes	☐

[1]

(d) Cathy has two glasses of wine.

The alcohol makes her sleepy.

Is this an example of a short term effect of alcohol or a long term effect?

.....

Explain your answer.

.....

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

[Total: 5]

3 Tom is investigating how exercise affects his pulse rate.

He measures his pulse rate while sitting down. It is 62 pulses per minute.

He then runs as fast as he can for one minute.

Then he sits down again and measures his pulse rate every minute for five minutes.

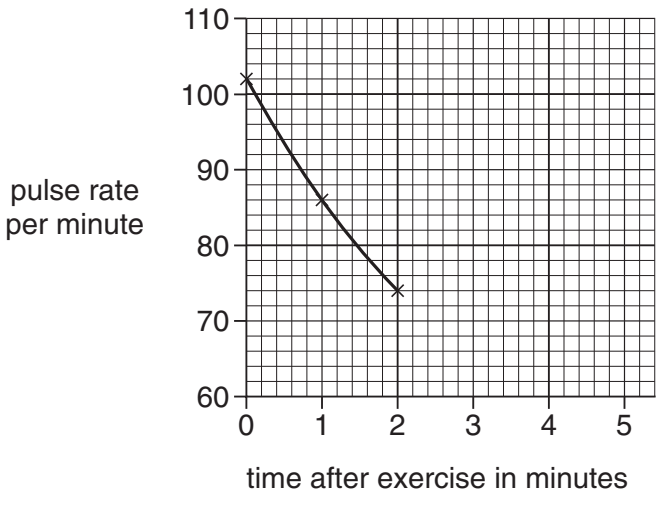
The table shows his results.

	pulse rate per minute
pulse rate immediately after exercising	102
pulse rate 1 minute after exercising	86
pulse rate 2 minutes after exercising	74
pulse rate 3 minutes after exercising	66
pulse rate 4 minutes after exercising	62
pulse rate 5 minutes after exercising	62

(a) Complete the graph of Tom's results.

The first three points have been plotted for you.

Finish the graph by plotting the last three points and then continue the line.



[3]

(b) Tom's pulse rate increases when he exercises.

Explain why.

.....

.....

.....

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

[Total: 6]

4 Elloise is ill and has a high temperature.

(a) A high temperature can damage the body.

(i) Write down **one** way that a high temperature can damage the body.

.....

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

(ii) Elloise sweats.

This helps her body to cool down.

Describe how sweating helps her body to cool down.

.....

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

(iii) Sweating to cool down is an example of **homeostasis**.

What is meant by homeostasis?

.....

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

(b) Elloise takes a pain killer.

Look at the list of drugs.

anabolic steroid

aspirin

caffeine

nicotine

temazepan

Write down the name of **one** pain killer.

Choose your answer from the list.

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

(c) Elloise goes to her doctor.

She asks for some antibiotics to treat her illness.

The doctor tells her that her illness is caused by a virus.

Should the doctor give Elloise antibiotics?

.....

Explain your answer.

.....

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

(d) After a few days Elloise recovers from her illness.

This is because her white blood cells produce chemicals.

These chemicals lock onto the viruses and destroy them.

Look at the list.

antibody

antigen

gene

toxin

vector

Which part of a virus do the chemicals from white blood cells lock onto?

Choose your answer from the list.

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

[Total: 6]

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PLEASE DO NOT WRITE ON THIS PAGE

Section B – Module C1

5 This question is about food additives.

(a) Look at the list. It shows the main types of food additives.

antioxidant

emulsifier

flavour enhancer

food colour

(i) Which additive stops food from reacting with oxygen?

Choose from the list.

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

(ii) Which additive helps oil and water to mix and not separate out?

Choose from the list.

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

(b) Write down **one** food that contains an emulsifier.

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

(c) Monosodium glutamate (MSG) is a flavour enhancer.

It is added to potato crisps.

Explain why.

.....

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

[Total: 4]

6 This question is about fuels.

(a) Crude oil is a **fossil fuel**.

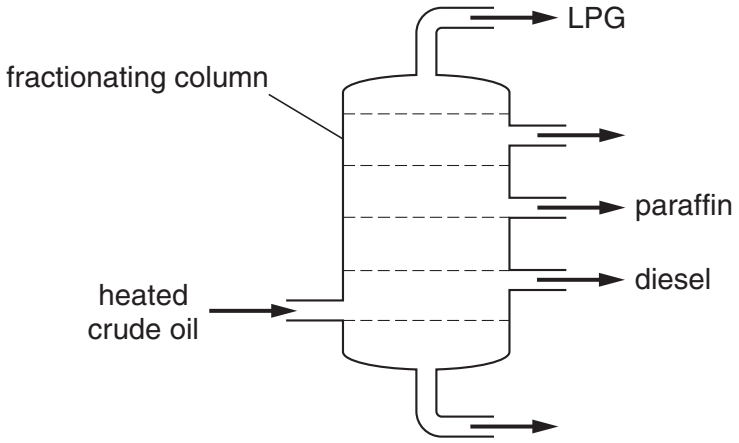
Write down the name of one **other** fossil fuel.

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

(b) Crude oil can be separated into fractions.

The process is called fractional distillation.

Look at the diagram. It shows how crude oil is separated.



(i) Place an **X** on the diagram to show the **coldest** part in the fractionating column.

Your **X** should be **inside** the fractionating column. **[1]**

(ii) LPG, paraffin and diesel are **fractions** from crude oil.

Write down the name of one **other** fraction.

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

(c) Cracking is another process used to make fuels.

Cracking changes large molecules into smaller molecules.

Why is cracking done?

.....

.....

What are the conditions used?

.....

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

[Total: 5]

7 This question is about removing nail varnish.

(a) Some solvents can dissolve nail varnish.

Look at the list of words about dissolving.

Draw a straight line to match each word to its meaning.

Draw only **three** lines.

insoluble	a dissolved solid in a solution
solute	a solid that does not dissolve in a liquid
solvent	a liquid that dissolves a solid

[2]

(b) Finchfield Pharmaceuticals make a new nail varnish remover.

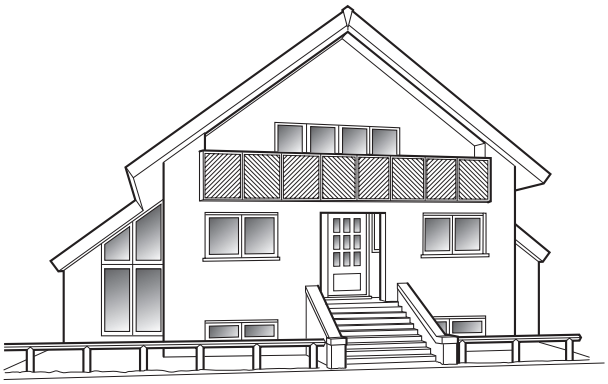
It must be tested before it can be used by humans.

Explain why.

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

[Total: 3]

8 Phil wants to choose a fuel to heat his house.



(a) Two factors Phil needs to think about when choosing a fuel are

- the cost of the fuel
- the energy released by the fuel.

Write about **other** factors which Phil needs to think about.

.....

.....

.....

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

(b) Phil decides to use natural gas (methane) to heat his house.

Look at the word equation.

It shows what happens during the **complete combustion** of methane.

methane + oxygen → ..... + water

Finish the word equation. **[1]**

(c) Phil uses a water heater.

Phil's water heater does not work properly.

When methane burns in the heater, **incomplete combustion** happens.

Explain why this is a problem.

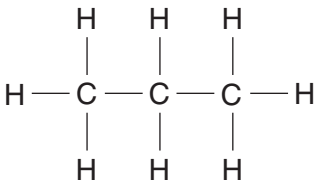
.....

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

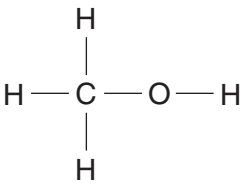
[Total: 4]

9 This question is about carbon compounds.

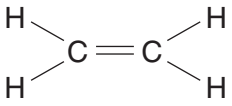
Look at the displayed formulas.



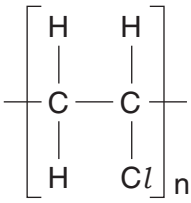
propane



methanol



ethene



poly(chloroethene)

carbon dioxide

(a) Ethene is a hydrocarbon.

Write down the names of the two elements present in a hydrocarbon.

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

(b) Which compound is an **alkane**?

Choose from the list.

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

(c) Which displayed formula contains only three carbon atoms?

Choose from the list.

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

(d) The molecular formula of ethene is C_2H_4.

Write down the molecular formula of methanol.

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

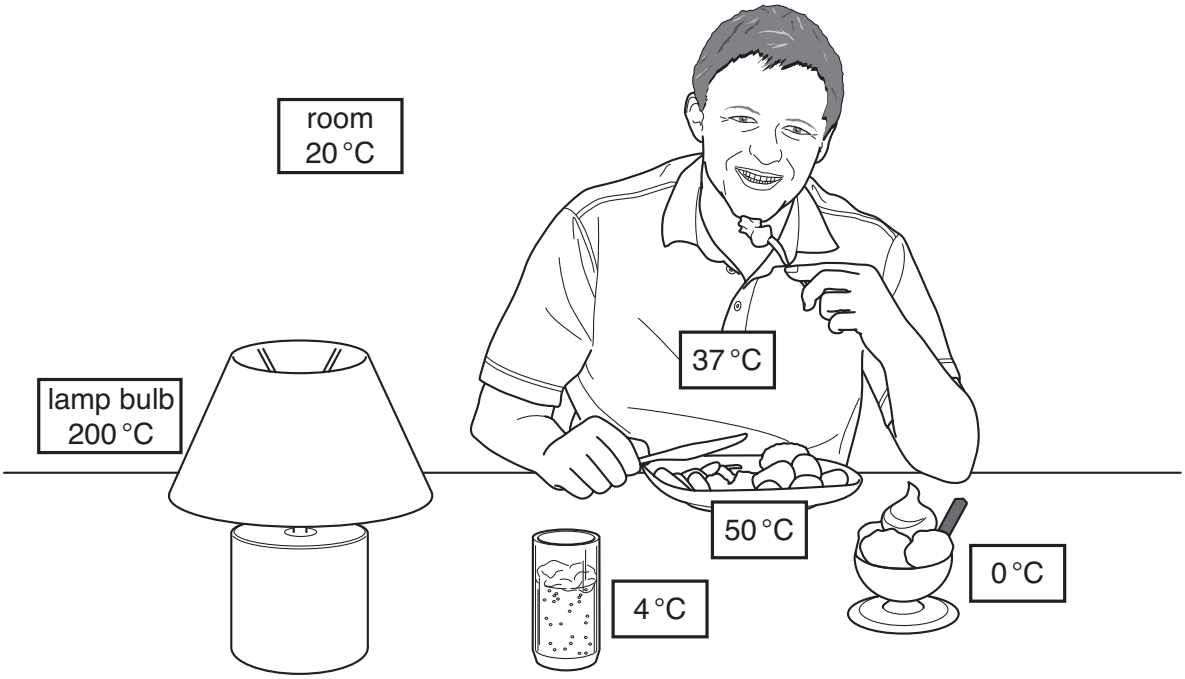
[Total: 4]

Section C – Module P1

10 Justin is eating a meal.

The temperature of the **room** is **20 °C**.

Look at the diagram.



(a) The temperatures of the five objects in the room are

meal = 50 °C

Justin = 37 °C

drink = 4 °C

ice cream = 0 °C

lamp bulb = 200 °C

Put **all** of the objects into the table to show the

- objects that **gain** heat
- objects that **lose** heat.

objects that gain heat	objects that lose heat

[3]

(b) Temperature is measured in **units** of degrees Celsius (°C).

Heat is a form of energy.

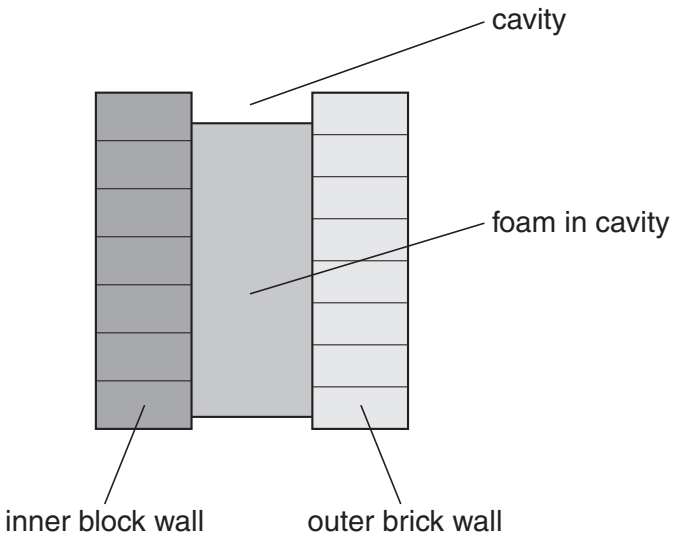
What are the units of heat?

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

[Total: 4]

11 There is a gap between the outer and inner walls of a house.

The gap is called the **cavity**.



(a) The cavity is often filled with **foam**.

This reduces the heat loss from the house.

Explain how.

.....

.....

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

(b) New houses have foam **blocks** in the cavity.

The foam blocks have **shiny** foil on both surfaces.

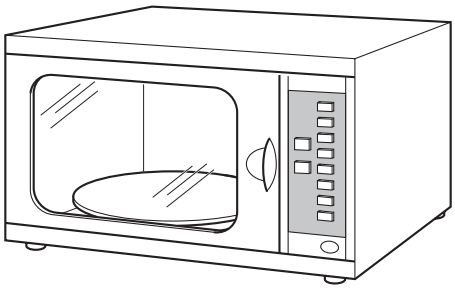
How does the shiny foil reduce heat loss?

.....

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

[Total: 3]

12 **(a)** Microwaves are used to cook food in a microwave oven.



Which substance in the food absorbs the microwaves?

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

(b) **Infrared** waves are also used for cooking.

Explain how infrared waves cook food.

.....

.....

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

(c) **(i)** Infrared waves can **also** be used to transmit data.

State **one** other use of infrared waves.

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

(ii) Two types of signal are used to transmit data.

One type is digital.

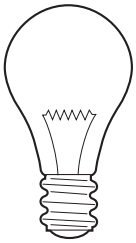
What is the other type?

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

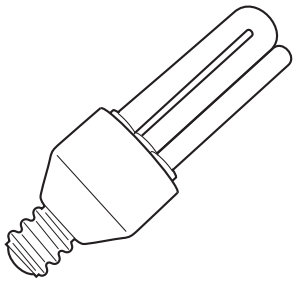
[Total: 5]

13 There are many ways of saving energy in the home.

Diane has two types of electric light bulbs in her house.



filament bulb



low energy bulb

(a) Low energy bulbs are an example of an energy saving method in the home.

Which **two** are energy saving methods in the home?

Choose from

A leaving light bulbs on all night

B closing the curtains at night

C putting insulation in the loft

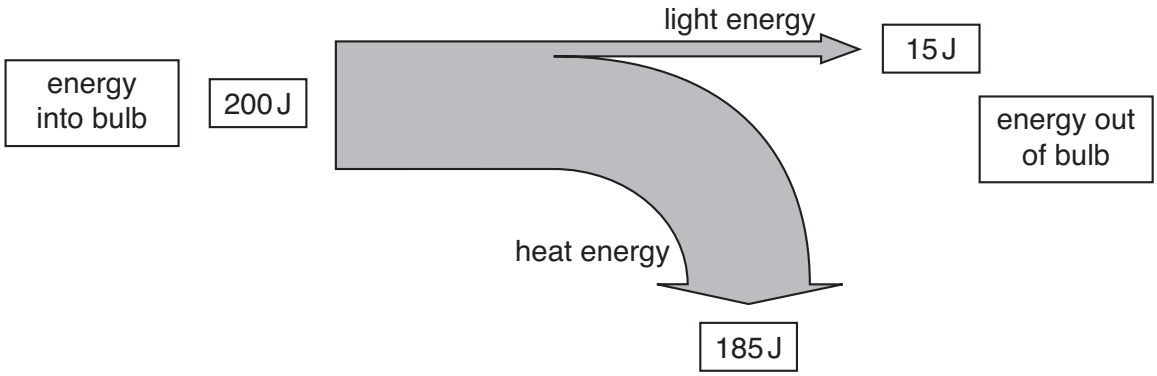
D leaving the TV on stand-by all night

E leaving curtains open at night

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

(b) Diane finds this diagram from a website.

It shows the energy **into** and **out of** a filament bulb.



Calculate the **efficiency** of the filament bulb.

The equations on page 2 may help you.

.....

.....

.....

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

[Total: 3]

14 This question is about electromagnetic waves.

(a) Wireless technology uses electromagnetic waves for communication.

Look at the statements about wireless technology.

Put a tick (✓) in the box beside the statement if it is **true**.

Put a cross (✗) in the box beside the statement if it is **false**.

Two have been done for you.

can **always** be used in remote locations	
available 24 hours a day	
no wiring is needed	✓
an aerial is needed to pick up the signals	✓
it is portable and convenient	

[2]

(b) Microwaves are used for wireless communication.

Look at this information about microwaves

- a microwave has a **wavelength** of 0.1 metres
- it also has a **frequency** of 3 000 000 000 hertz.

Calculate the **speed** of the microwaves.

The equations on page 2 may help you.

.....

.....

.....

answer ..... metres per second **[2]**

(c) Some other electromagnetic waves are

- ultraviolet
- radio
- X-rays.

What do you know about the speed of **all** electromagnetic waves?

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

[Total: 5]

END OF QUESTION PAPER

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.