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 14 January 2010
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

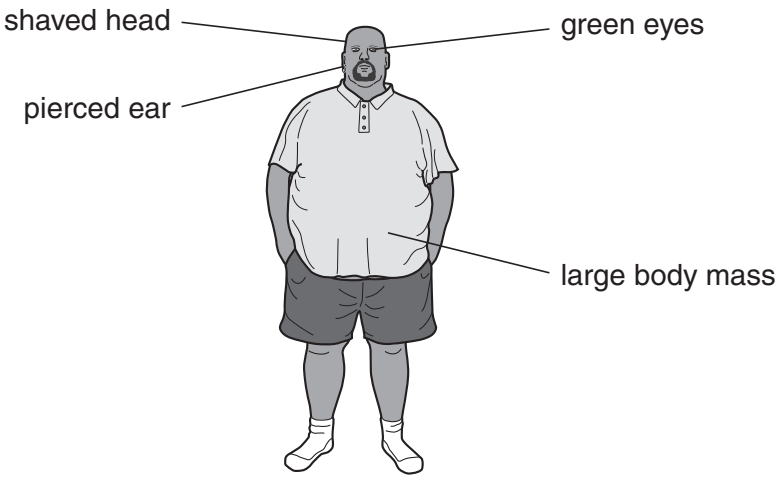
power = voltage × current

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

Answer **all** the questions.

Section A – Module B1

1 Look at Rob.



(a) Some of Rob's features are controlled only by genes, some only by the environment and some by both.

Put ticks (✓) in the table to show how each feature is controlled.

The first one has been done for you.

feature	controlled only by genes	controlled only by the environment	controlled by both genes and the environment
green eyes	✓		
large body mass			
pierced ear			
shaved head			

[3]

(b) Rob's green eye colour is controlled by his genes.

Rob has a daughter. She does not have green eyes.

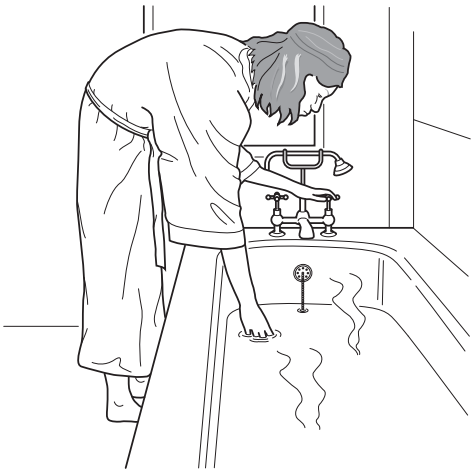
Suggest why she does **not** have green eyes.

.....

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

[Total: 4]

2 Lynne is going to have a bath.



She puts her hand in the water and quickly pulls it out because it is too hot.

(a) This response is a reflex.

Write down **two** ways that you can tell that this response is a reflex.

1 .....

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

(b) Which sense organ is Lynne using to sense that the water is too hot?

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

(c) How does information get to Lynne's brain to tell her that the water is too hot?

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

[Total: 4]

3 Richard is feeling hot.

He decides to measure his body temperature.

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

In your answer, write about

- the apparatus he should use
- how he should use the apparatus.

.....

.....

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

(b) Body heat is produced when cells respire.

What **two** substances does a cell need to respire?

1 .....

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

(c) **(i)** What should Richard's normal body temperature be?

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

(ii) Why is it important that Richard's body temperature stays at this value?

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

[Total: 6]

4 This question is about being healthy.

(a) A balanced diet contains all the following food types.

carbohydrate

fat

protein

minerals

vitamins

fibre

water

The amount of each food type you should eat varies from person to person.

Mary

Vicki

Mary is in a swimming club and swims every day.

Vicki is the same age and weight as Mary, but does **not** exercise as much.

How should Mary's diet be different from Vicki's?

In your answer, write about

- which food type or types Mary should have more of or less of than Vicki
- the reason or reasons for this.

.....

.....

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

(b) Vicki is concerned about her health.

She measures her mass and height so that she can calculate her BMI (body mass index).

Vicki's mass is 60 kg.

Her height is 170 cm.

Calculate Vicki's BMI.

Use the formula

$$\text{BMI} = \frac{\text{mass in kg}}{(\text{height in m})^2}$$

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

(c) Vicki's BMI shows she is not overweight.

Having a high BMI increases the risk of getting heart disease.

(i) Smoking can also increase the risk of heart disease.

Nicotine is one substance in cigarette smoke that is linked to heart disease.

Write down **one other** substance in cigarette smoke that is linked to heart disease.

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

(ii) Look at the list of drug types.

depressant

hallucinogen

painkiller

performance enhancer

stimulant

What type of drug is nicotine?

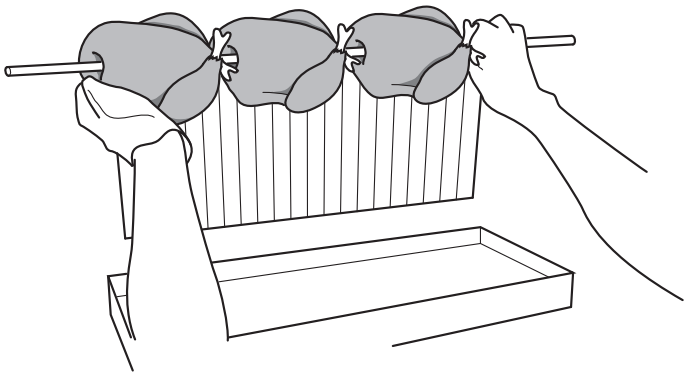
Choose your answer from the list.

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

[Total: 6]

Section B – Module C1

5 Trevor is cooking some chickens.



He roasts the chickens in an oven.

(a) Write down two **other** ways Trevor could cook the chickens.

1 .....

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

(b) **(i)** Cooking chickens is a chemical change.

Explain why.

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

(ii) Trevor takes the chickens out of the oven.

Write about **one other** way the chickens have changed during cooking.

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

[Total: 4]

6 Crude oil is a fossil fuel.

Crude oil is a mixture of hydrocarbons.

(a) What is a **hydrocarbon**?

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

(b) Petrol can be made from crude oil by fractional distillation.

Write down the names of **two** other fuels that can be made from crude oil.

Choose from the list.

coal

coke

diesel

propane

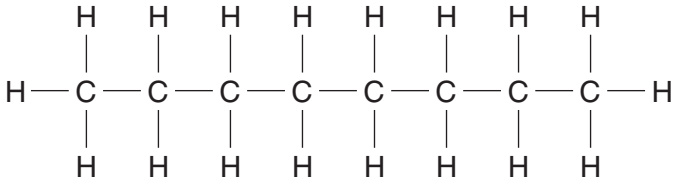
wood

1 .....

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

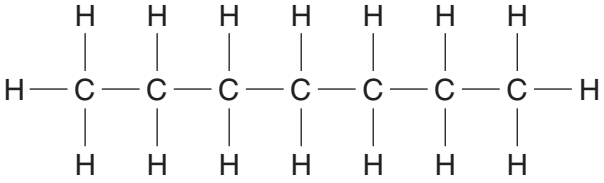
(c) Two of the hydrocarbons found in petrol are called heptane and octane.

(i) Look at the displayed formula for **octane**.



What is the total number of **atoms** in one molecule of octane? ..... **[1]**

(ii) Look at the displayed formula for **heptane**.



Heptane has the molecular formula C_7H_{16}.

What is the molecular formula for **octane**? ..... **[1]**

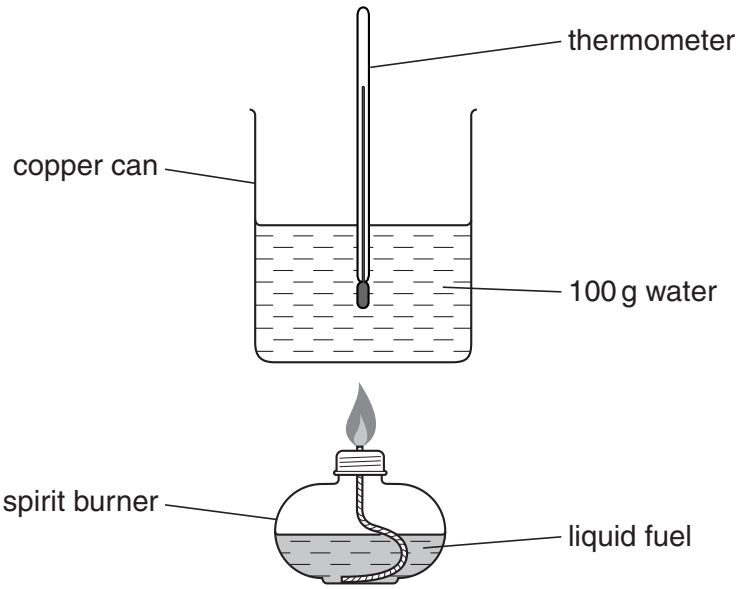
[Total: 5]

7 Steve and Sarah investigate some fuels.

They want to find out which fuel gives off most energy.

They test four liquid fuels.

Look at the diagram. It shows the apparatus they use.



They burn 1.0 g of fuel each time.

Look at the table.

The table shows their results.

fuel	temperature at start in °C	temperature at end in °C
ethanol	20	37
methanol	18	28
paraffin	20	35
petroleum spirit	18	42

(a) Which fuel transfers the **most** energy to the water?

.....

Explain how you know.

.....

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

(b) Paraffin contains hydrocarbons.

(i) When complete combustion of paraffin happens, two substances are made.

Write down the name of **one** of these substances.

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

(ii) Steve and Sarah watch the paraffin burn in the spirit burner.

They notice that it burns with a very sooty, yellow flame.

Suggest why.

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

[Total: 4]

8 This question is about polymers.

(a) Poly(ethene) is a polymer.

Polymers make plastics.

Write down **one** use for plastics made from poly(ethene).

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

(b) Poly(ethene) is **non-biodegradable**.

What is meant by non-biodegradable?

.....

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

(c) Poly(chloroethene) is a polymer.

The plastic from this polymer is used to make water pipes.

One property of poly(chloroethene) is that it is easy to shape.

Write about **other** properties of poly(chloroethene) that make it suitable for making water pipes.

.....

.....

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

[Total: 4]

9 Sam has bought a new bottle of perfume.

(a) One of these chemicals gives this perfume its smell.

Which one?

Choose from the list.

acid

ester

salt

water

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

(b) A perfume must have several properties.

One of these properties is that it must not react with water.

Write down one **other** property that a perfume must have.

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

(c) Sam's perfume was tested before the company was allowed to sell it.

Write down **one** reason why.

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

[Total: 3]

Section C – Module P1

10 The diagrams show the polar ice cap today and how it may look in 200 years time.

The polar ice cap becomes **much** smaller.

This could happen due to **global warming**.

(a) Write down **two** things that may **increase** global warming.

1 .....

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

(b) Erupting volcanoes can cause the Earth's temperature to **fall**.

Explain how.

.....

.....

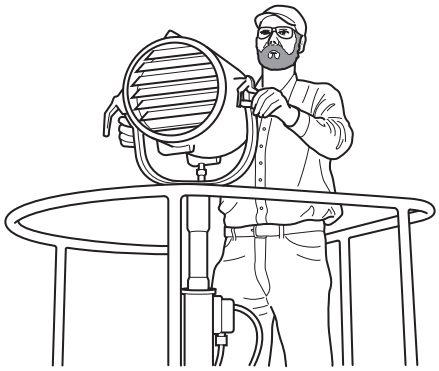
..... **[2]**

[Total: 4]

11 Many years ago it was difficult to send messages long distances.

A runner had to carry a written message.

The use of flashing light signals greatly improved this.



(a) How is sending messages using flashing lights better than using a runner?

.....

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

(b) Messages sent this way use a series of flashing lights.

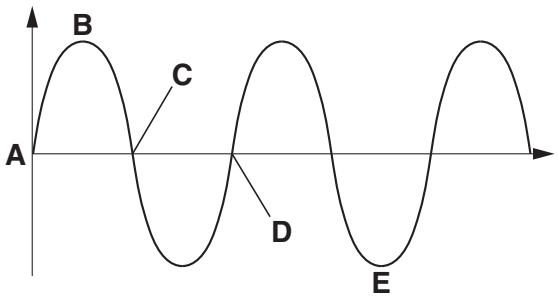
This is a type of code.

What is the **name** of this code?

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

(c) A light wave is a **transverse** wave.

Look at the diagram.



(i) Which letter shows a **crest**?

answer ……

[1]

(ii) The **wavelength** is the distance between letter …… and letter …… .

[1]

[Total: 4]

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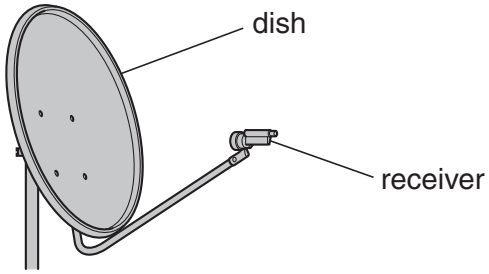
12 The diagram shows a satellite receiver dish.



Satellite dishes use wireless technology.

(a) What type of radiation does wireless technology use?

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

(b) What happens to the signals when they reach the dish?

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

(c) Two types of signal are used to transmit information.

One type is **digital**.

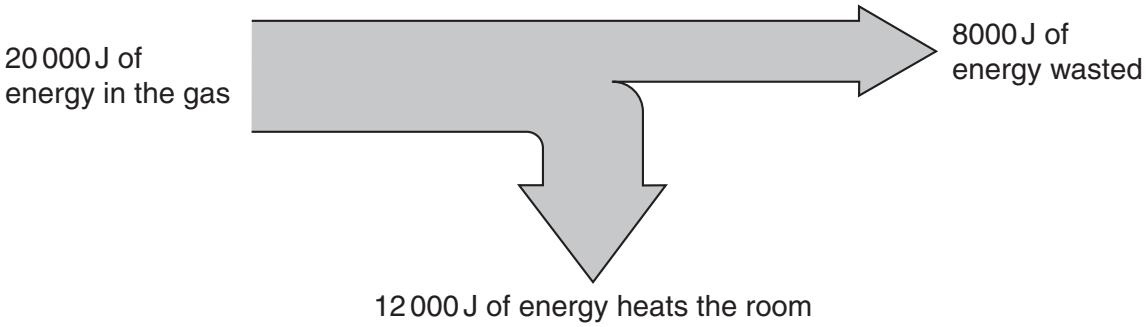
Write down the name of the other type of signal.

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

[Total: 3]

13 Asif has a gas fire that heats the living room of his house.

The diagram shows how much of the energy in the gas actually heats the room.



(a) Calculate the efficiency of the gas fire.

The equations on page two may help you.

.....

.....

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

(b) Asif wants to make his house more energy efficient.

He makes improvements to his house.

Draw a straight line from each **improvement** to its correct **explanation**.

improvement	**explanation**
put shiny foil behind radiators	it is a poor conductor
put fibreglass in the loft space	it stops cold air entering
fit draught-proofing around windows and doors	it reflects heat energy (infrared)

[2]

(c) Asif insulates his loft. It costs £240.

This reduces his energy bill by £80 every year.

Calculate the payback time for his loft insulation.

.....

.....

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

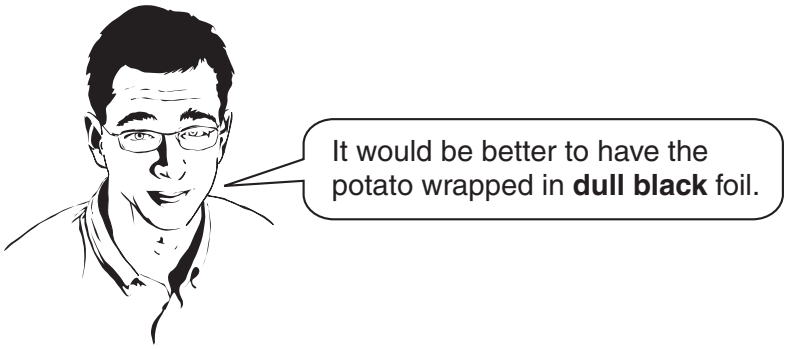
[Total: 5]

14 (a) Molly wants to bake a potato in an oven.

The oven emits infrared radiation that cooks the potato.

She thinks that wrapping the potato in **shiny** foil will heat it quicker.

Liam does not agree.



Liam is correct.

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

Dull black foil keeps the heat in better. ☐

Dull black foil reflects the radiation better. ☐

Dull black foil absorbs the radiation better. ☐

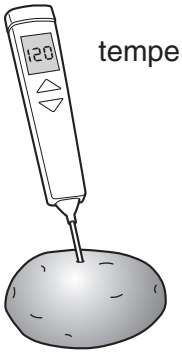
Shiny foil reflects more radiation away. ☐

[2]

(b) Molly cooks two potatoes.

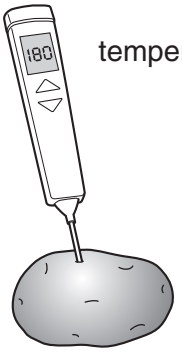
The potatoes are the same **size** and **mass**.

She measures the temperature of both potatoes.



temperature = 120

A



temperature = 180

B

(i) Distance is measured in metres (m).

What is temperature measured in?

Choose from

A **J** **°C** **N** **W**

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

(ii) Molly leaves the potatoes to stand for ten minutes.

She measures the temperatures again.

Look at her results.

	at the start	**after 10 minutes**	**drop in temperature**
temperature of potato A	120	70	50
temperature of potato B	180	80	100

The temperature of potato **B** dropped the most.

Potato **B** cooled faster than potato **A**.

Why?

.....

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

[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.