THIS IS A NEW SPECIFICATION

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F

Thursday 12 January 2012 – Morning

GCSE GATEWAY SCIENCE
SCIENCE B

B711/01 Science modules B1, C1, P1 (Foundation Tier)

B722150112

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)

Duration: 1 hour 15 minutes

B711101

Candidate forename		Candidate surname	

Centre number						Candidate number				

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. HB pencil may be used for graphs and diagrams only.
- Answer **all** the questions.
- 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).
- Do **not** write in the bar codes.

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil (✎).
- A list of equations can be found on page 2.
- The Periodic Table can be found on the back page.
- The number of marks is given in brackets **[ ]** at the end of each question or part question.
- The total number of marks for this paper is **75**.
- This document consists of **24** pages. Any blank pages are indicated.

EQUATIONS

energy = mass × specific heat capacity × temperature change

energy = mass × specific latent heat

$$\text{efficiency} = \frac{\text{useful energy output (× 100\%)}}{\text{total energy input}}$$

wave speed = frequency × wavelength

power = voltage × current

energy supplied = power × time

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

distance = average speed × time

$$s = \frac{(u + v)}{2} \times t$$

$$\text{acceleration} = \frac{\text{change in speed}}{\text{time taken}}$$

force = mass × acceleration

weight = mass × gravitational field strength

work done = force × distance

$$\text{power} = \frac{\text{work done}}{\text{time}}$$

power = force × speed

$$KE = \frac{1}{2}mv^2$$

momentum = mass × velocity

$$\text{force} = \frac{\text{change in momentum}}{\text{time}}$$

GPE = mgh

$$mgh = \frac{1}{2}mv^2$$

$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

Answer **all** the questions.

Section A – Module B1

1 The number of people with heart disease in the UK is increasing.

Doctors give advice to their patients on how to reduce the risk of developing heart disease.

One piece of advice is to eat a balanced diet without too much salt or saturated fat.

(a) What advice, **other than diet**, should doctors give about how to reduce the risk of heart disease?

.....

.....

.....

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

(b) Some diets lead to a build up of cholesterol in the blood.

Drugs can be used to lower cholesterol levels.

New drugs have to be tested before they are used.

Why do new drugs need to be tested?

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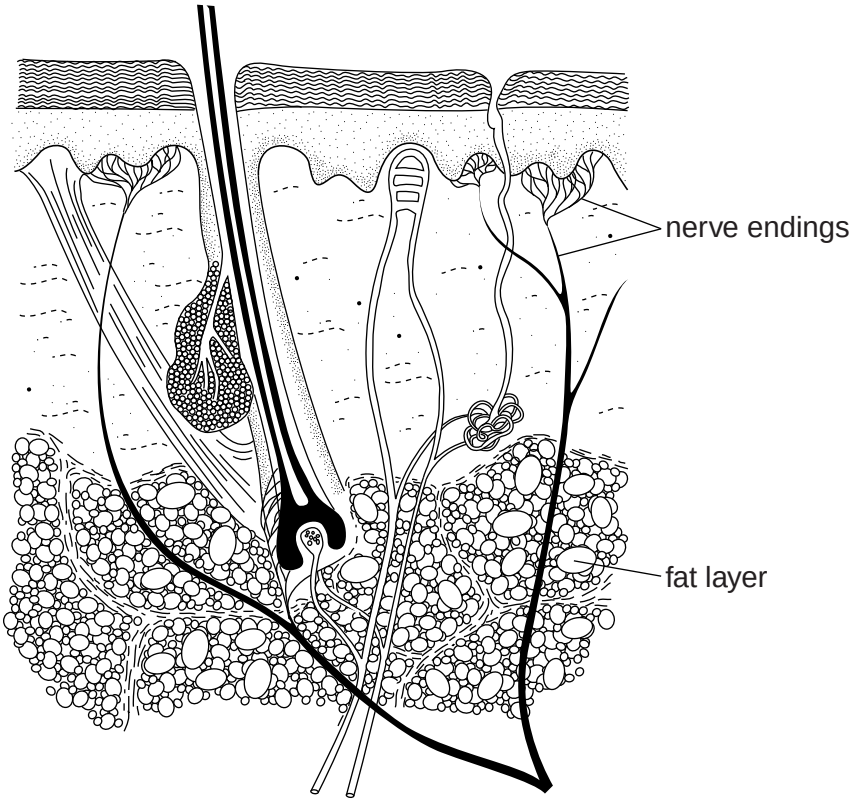
..... **[2]**

[Total: 4]

2 The diagram shows a section through human skin.



(a) Sam has fallen over and damaged the skin on her knee.

(i) Sam's mum tells her that she should put a plaster over the damaged skin until a scab forms.

Suggest why Sam should do this.

.....

.....

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

(ii) Sam now has a scab. New skin is growing under the scab.

Which food type is most important for growing new skin?

Put a (ring) around the **best** answer.

carbohydrate **fibre** **minerals** **protein** **[1]**

(b) Fat in skin helps to maintain normal body temperature by reducing heat loss.

(i) What is normal body temperature?

..... °C **[1]**

(ii) If the body is in danger of getting too hot, heat loss from the skin can be increased.

Write down **one** way heat loss can be increased.

.....

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

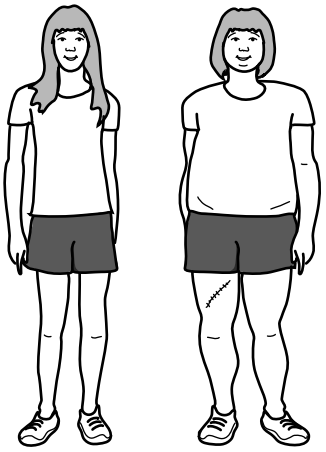
(c) The skin is also a sense organ.

Write down **one** thing that the skin can sense.

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

[Total: 6]

3 **(a)** Julia and Jane are identical twins. This means they came from the same fertilised egg.



Julia **Jane**

Look at the pictures.

Julia and Jane have the same coloured eyes and are the same height.

Identify the **differences** between Julia and Jane.

Explain why some of their features are the same but some are different.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

(b) Julia and Jane have a brother called James.

How is the sex of girls and boys determined?

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

[Total: 8]

4 The table shows information about the alcohol in different brands of beer.

brand	volume of beer in can or bottle in ml	units of alcohol in can or bottle
A	440	1.8
B	330	1.6
C	440	1.5
D	275	1.0
E	330	1.7

1 unit = 10 ml of pure alcohol

1 unit is also the amount of alcohol that the average adult can drink and remove from their blood in one hour.

(a) How many ml of alcohol are in one can of **brand A**?

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

(b) **(i)** If an average adult drinks one can of **brand C**, how many **minutes** will it take to remove all the alcohol from the blood?

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

(ii) Billy drinks a can of **brand C**.

It takes 120 minutes for all the alcohol to be removed from his blood.

This is different from the time it takes an average adult.

Explain why it is different.

.....

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

(c) Billy drinks 100 ml of each brand on different days, one brand per day.

Which brand will take longest to be removed from his blood?

You **must** show your working.

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

(d) Billy should **not** drive a car while there is alcohol in his blood.

Explain why.

.....

.....

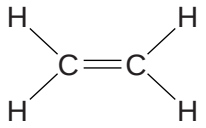
.....

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

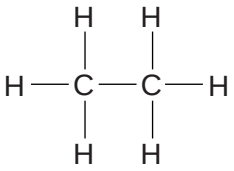
[Total: 7]

Section B – Module C1

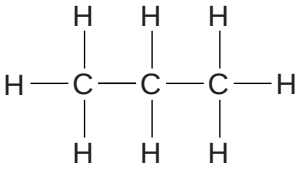
5 Look at the displayed formulas of some carbon compounds.



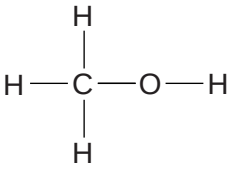
A



B



C



D

(a) Which displayed formula contains a total of 8 atoms?

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

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

(b) Which compound is **not** a hydrocarbon?

Explain your answer.

.....

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

(c) Which compound will decolourise bromine water?

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

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

(d) Compound **A** is ethene.

What is the name of the polymer that is made from ethene?

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

(e) What is the molecular formula of compound **C**?

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

[Total: 6]

6 Look at the table. It shows some information about polymers.

polymer	melting point in °C	solubility in water	solubility in petrol	is it biodegradable?
A	80	slightly soluble	insoluble	yes
B	90	slightly soluble	soluble	no
C	120	insoluble	insoluble	yes
D	95	insoluble	soluble	no

(a) Which polymer is suitable for making a container to hold boiling water?

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

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

(b) Which polymer should be used to make a litter bin for use in a park?

Explain your answer.

.....

.....

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

(c) Waste polymers need to be disposed of.

Write down **one** way that local councils dispose of waste polymers.

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

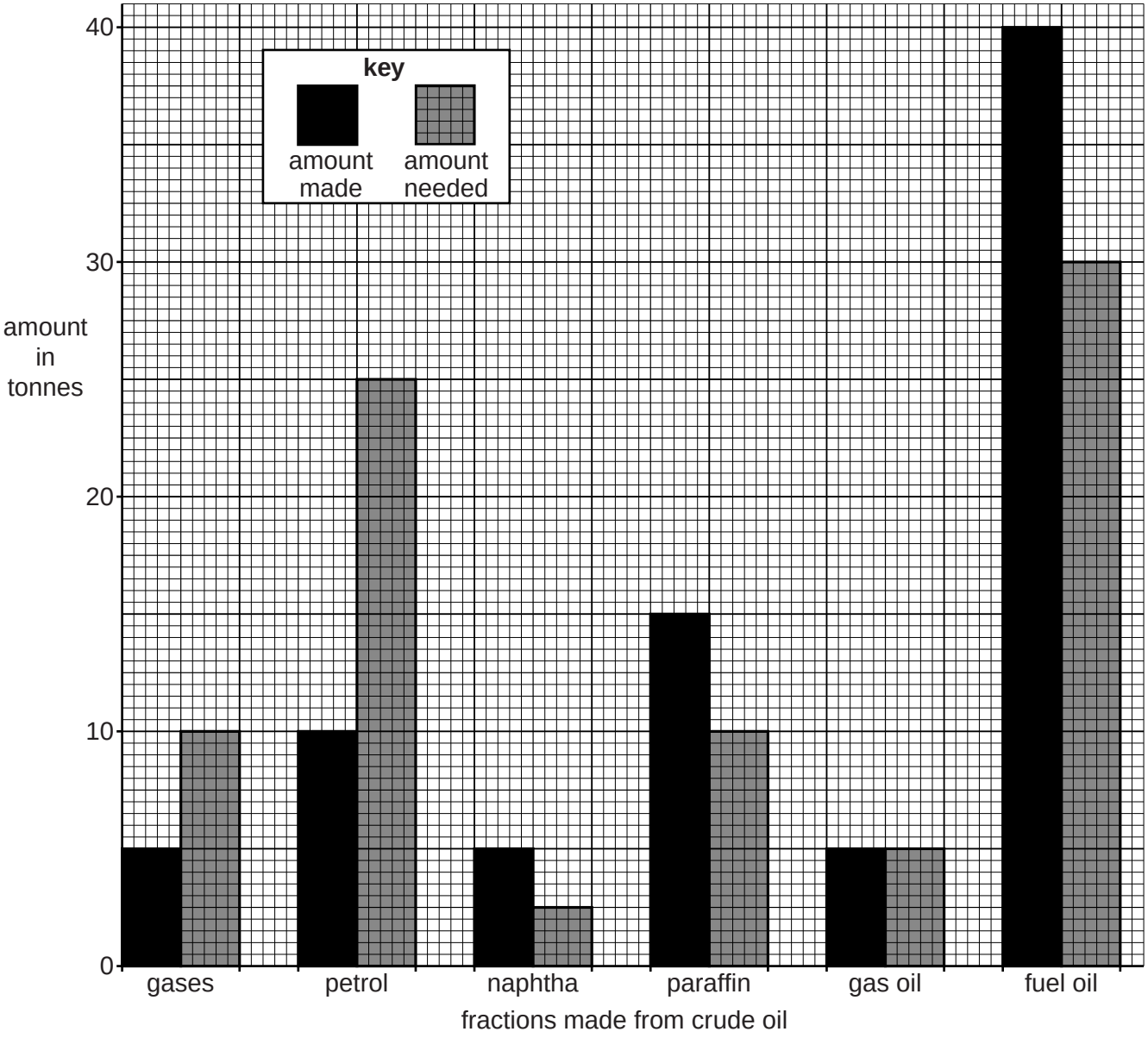
[Total: 4]

7 Oil refineries separate crude oil into useful fractions.

They do this by fractional distillation.

The bar chart shows the amount of some fractions **made** from 100 tonnes of crude oil.

It also shows the amount of these fractions **needed** for everyday uses.



(a) Look at the bars for **petrol** and **fuel oil**.

What problems does this give the manager of an oil refinery?

Describe in detail how these problems are overcome.

The quality of written communication will be assessed in your answer to this question.

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..... **[6]**

(b) Crude oil needs to be transported to oil refineries using oil tankers.

Sometimes oil spillages happen.

Write about some of the problems caused by spilling crude oil into the sea.

.....

.....

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

[Total: 8]

8 Look at the table. It shows information about some fuels.

fuel	energy value in kilojoules per kg	availability	cost in £ per kg	state at room temperature	estimated years of supply left	pollution
A	4800	good	1.30	liquid	20	makes carbon dioxide and some sulfur dioxide
B	4960	limited	0.80	liquid	12	makes carbon dioxide
C	8950	good	0.33	solid	50	makes carbon dioxide and large amounts of sulfur dioxide
D	3700	good	1.30	gas	8	makes carbon dioxide

(a) Fuel **A** is best for powering a car.

Explain why.

.....

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

(b) A new power station plans to use fuel **C**.

Explain the advantages and disadvantages of this choice.

.....

.....

.....

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

(c) The table lists some factors to be considered when choosing a fuel.

Write down one **other** factor to be considered when choosing a fuel.

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

(d) Fuel **C** makes large amounts of sulfur dioxide.

How is sulfur dioxide made when fuel **C** burns?

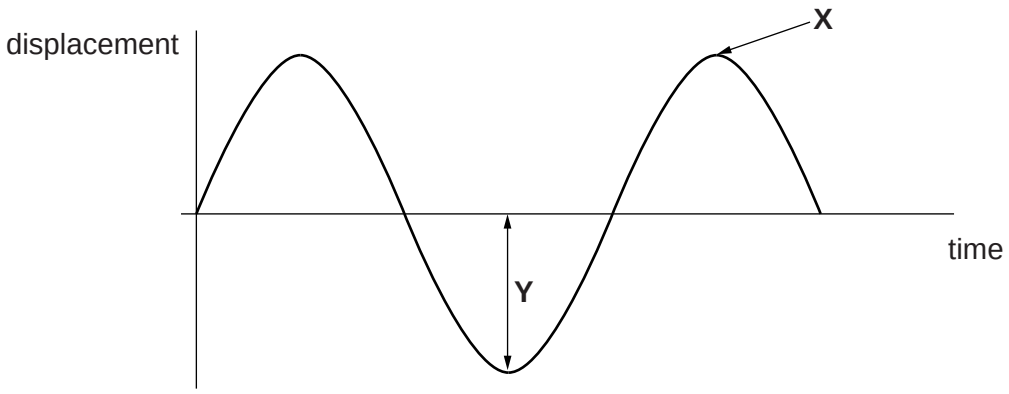
..... **[1]**

[Total: 7]

Section C – Module P1

9 This question is about waves.

(a) Look at the diagram of a wave.



(i) Write down the name of the feature labelled **X**.

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

(ii) Write down the name of the feature labelled **Y**.

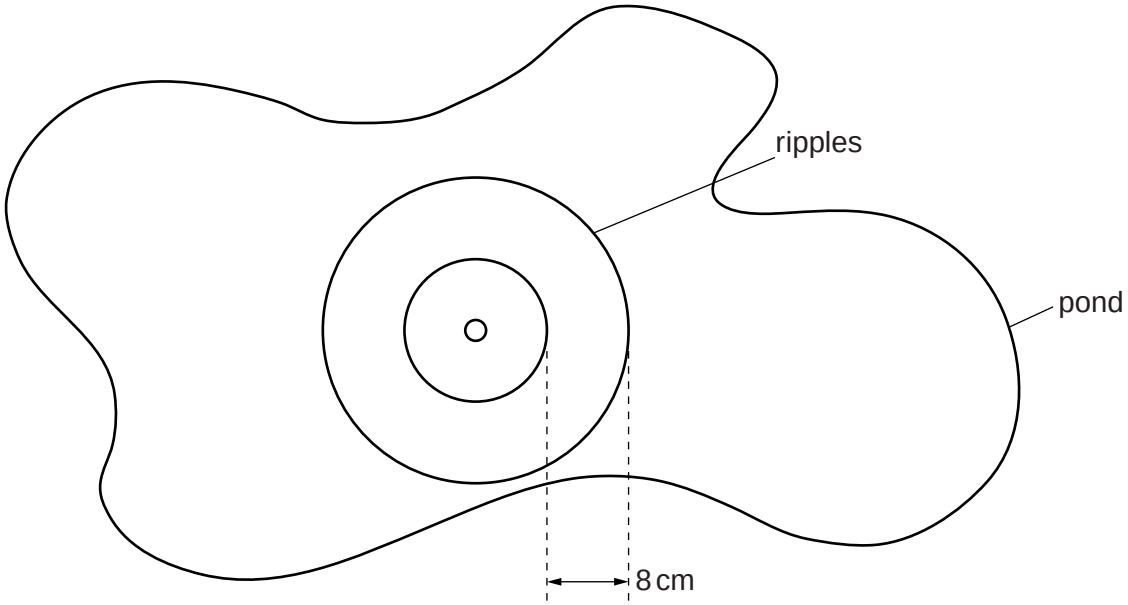
..... **[1]**

Turn over for the remainder of question 9

(b) Zeta drops a ball into a pond.

She notices that the ball causes ripples 8 cm apart.

The ball moves up and down on the water with a frequency of 2 Hz.



Calculate the speed that the wave moves over the water.

.....

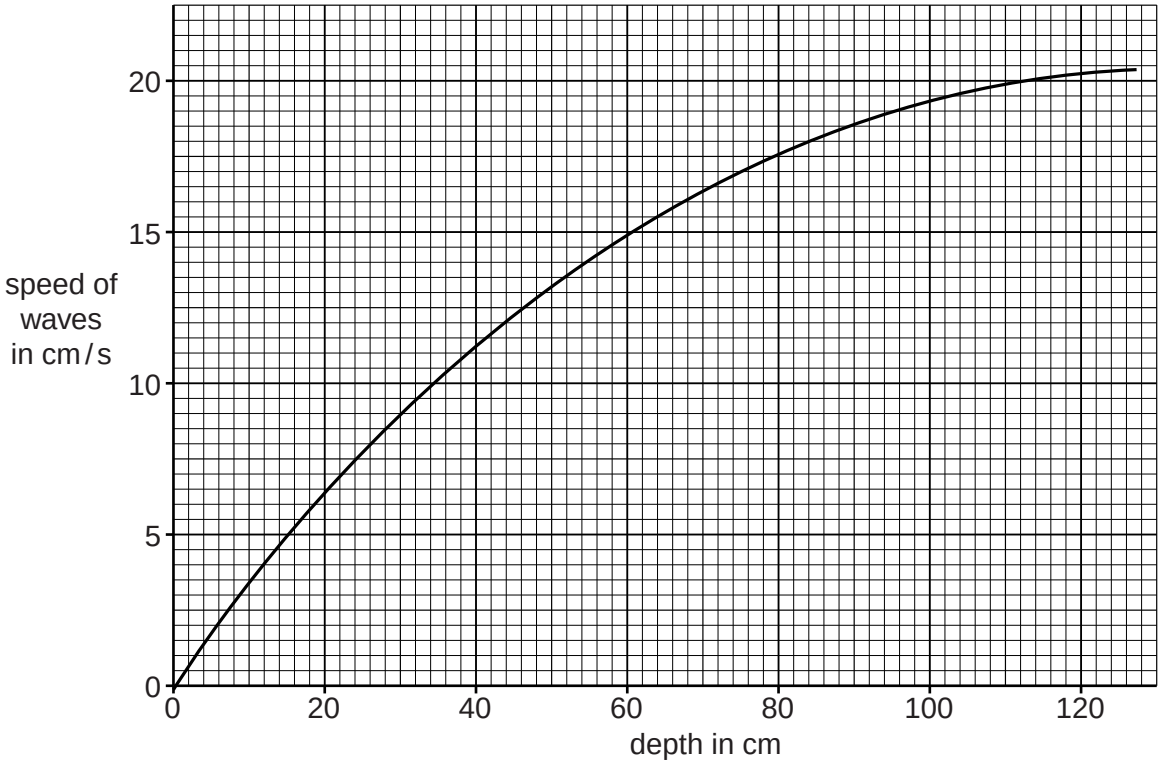
.....

answer ..... cm/s **[2]**

(c) Zeta drops the ball into different parts of the pond.

These parts have different depths.

Look at the graph of her results.



Complete the sentence using information from the graph.

When the pond gets ..... the speed of the waves ..... **[1]**

[Total: 5]

10 This question is about heat energy.

(a) Look at the table.

It shows the temperature of some objects.

object	temperature of object in °C
boiling water	100
cooker hot plate	600
cup of tea	80
filament of light bulb	1200

Each hot object is in a room at 20°C, where they are allowed to cool down.

When they cool, the filament of the light bulb cools at the highest rate.

Explain why.

.....

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

(b) To make the tea Tom boiled some water in a kettle.

The kettle used 320 000 J of energy.

It took 80 000 J to boil the water to make his tea.

The rest of the energy was wasted.

(i) Calculate the efficiency of this method of making a cup of tea.

.....

.....

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

(ii) Suggest how he could improve the efficiency of this method.

.....

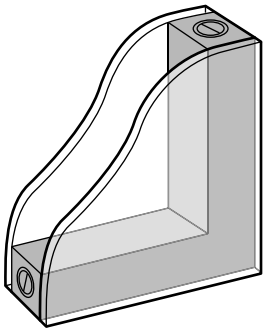
..... **[1]**

[Total: 4]

11 Vicky finds that the energy bills for her house are high.

She investigates ways of reducing them.

She expects that double glazing her windows will reduce the energy loss by 50%.



After fitting the double glazing she finds that the energy loss has **not** reduced by 50%.

Describe and explain how she could further reduce her energy loss and explain why the energy loss has not halved.

The quality of written communication will be assessed in your answer to this question.

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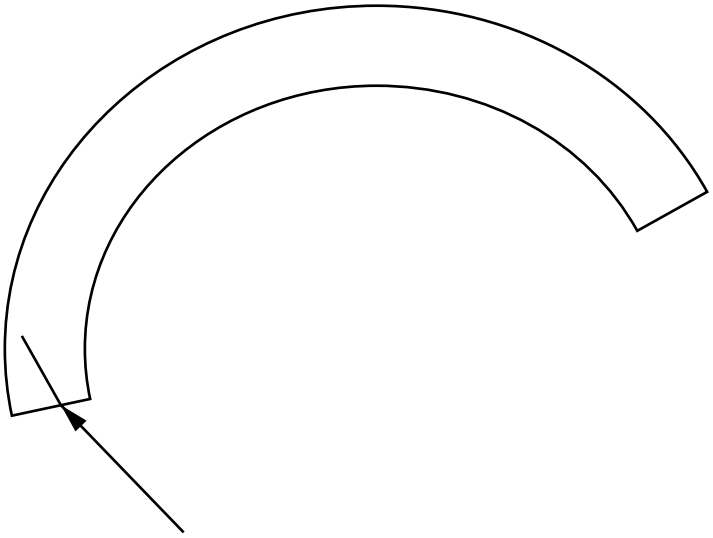
..... **[6]**

[Total: 6]

12 **(a)** Many telephone companies use optical fibres to carry signals over large distances.

Look at the enlarged diagram of an optical fibre.



Continue the ray to show its path along the fibre from one end to the other. **[2]**

(b) Lasers produce a narrow intense beam of light.

Write down **one** use of a laser.

.....

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

(c) Some people think the use of mobile phones is safe.

Others think mobile phones may be harmful to health.

Write about one of the possible health risks from using mobile phones and suggest how this risk can be reduced.

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.....

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

[Total: 5]

13 Sunbathing can be harmful.

Its effects can be reduced by using sun cream.

(a) Look at the information about sun creams.

type of sun cream		time to stay in sun without burning
A	no sun cream	15 minutes
B	supersun	2 hours
C	alltan	1 hour 15 minutes
D	noburn	45 minutes
E	catan	3 hours

Which type of sun cream has the highest sun protection factor (SPF)?

Choose from **A** **B** **C** **D** **E**

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

(b) Exposure to sunlight produces a suntan and can cause sunburn.

Write down one **other** effect exposure to sunlight can cause.

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

(c) Which type of electromagnetic radiation causes sunburn?

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

[Total: 3]

14 Will and his friends go on a school trip. They each take a packed lunch from the school fridge.

Each lunch is wrapped in a different material as shown in the table.

name	wrapping material
Will	white paper bag
Rose	brown paper bag
Paul	clear polythene bag
Olivia	silver cooking foil

They leave their lunches in the sun.

Whose lunch will be the coolest when they come back to eat it?

Explain your answer.

.....

.....

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

[Total: 2]

END OF QUESTION PAPER

PLEASE DO NOT WRITE ON THIS PAGE

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.