

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS
GCSE**

B711/01

GATEWAY SCIENCE

SCIENCE B

Science modules B1, C1, P1 (Foundation Tier)

THURSDAY 12 JANUARY 2012: Morning

DURATION: 1 hour 15 minutes

SUITABLE FOR VISUALLY IMPAIRED CANDIDATES

**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)

READ INSTRUCTIONS OVERLEAF

INSTRUCTIONS TO CANDIDATES

- Write your name, centre number and candidate number in the boxes on the first page. 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).

INFORMATION FOR CANDIDATES

- Your quality of written communication is assessed in questions marked with a pencil () .
- A list of equations can be found on pages 4 and 5.
- The Periodic Table is provided.
- 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.

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EQUATIONS

$$\text{energy} = \text{mass} \times \frac{\text{specific heat}}{\text{capacity}} \times \text{temperature change}$$

$$\text{energy} = \text{mass} \times \text{specific latent heat}$$

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

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

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

$$\text{energy supplied} = \text{power} \times \text{time}$$

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

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

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

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

force = mass × acceleration

weight = mass × gravitational field strength

work done = force × distance

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

power = force × speed

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

momentum = mass × velocity

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

GPE = mgh

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

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?

[2]

[Total: 4]

2 This question is about 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]

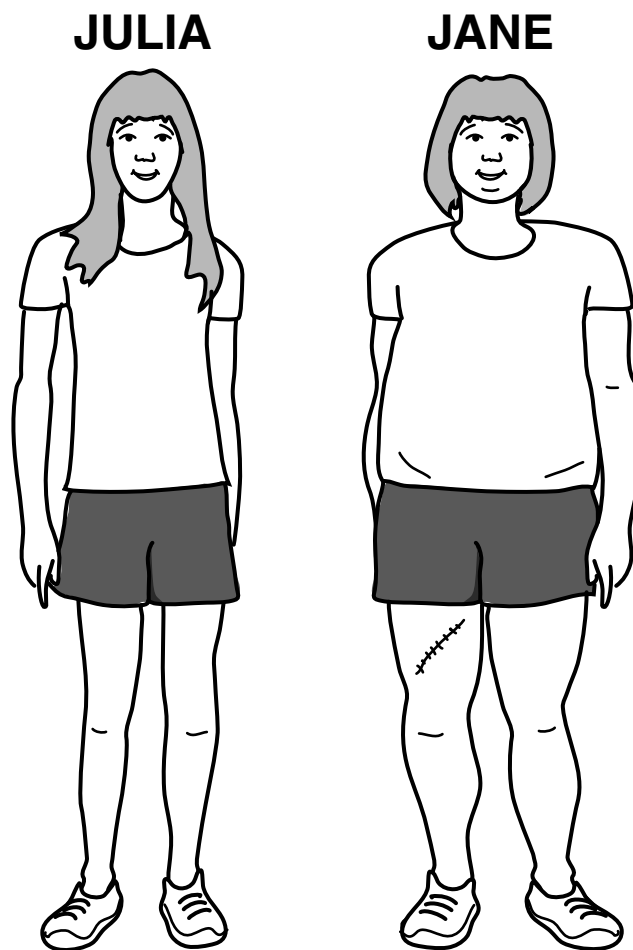
(c) The skin is also a sense organ.

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.**



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.

[6]

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

How is the sex of girls and boys determined?

[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.

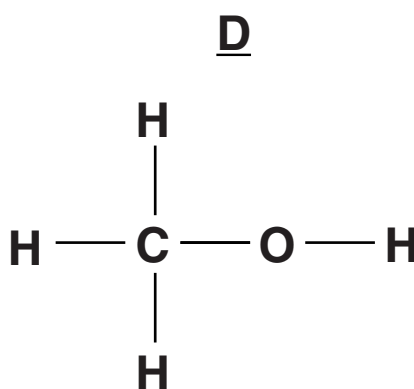
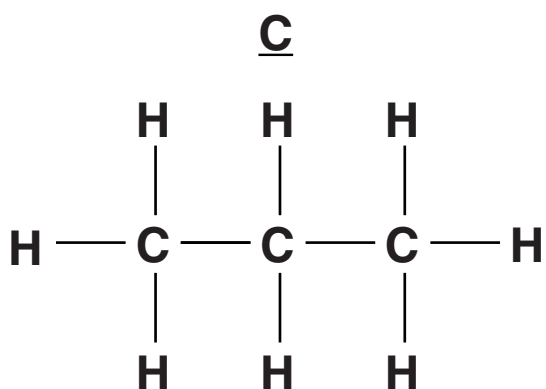
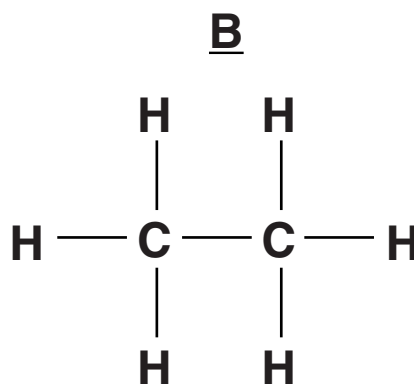
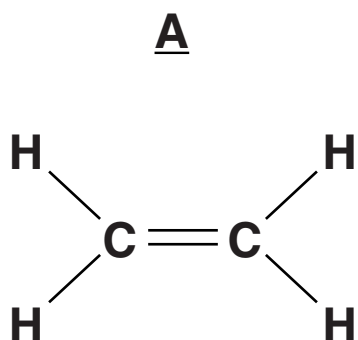
[2]

[Total: 7]

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SECTION B – MODULE C1

5 Look at the displayed formulas of some carbon compounds.



(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, opposite. It shows some information about polymers.

(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]

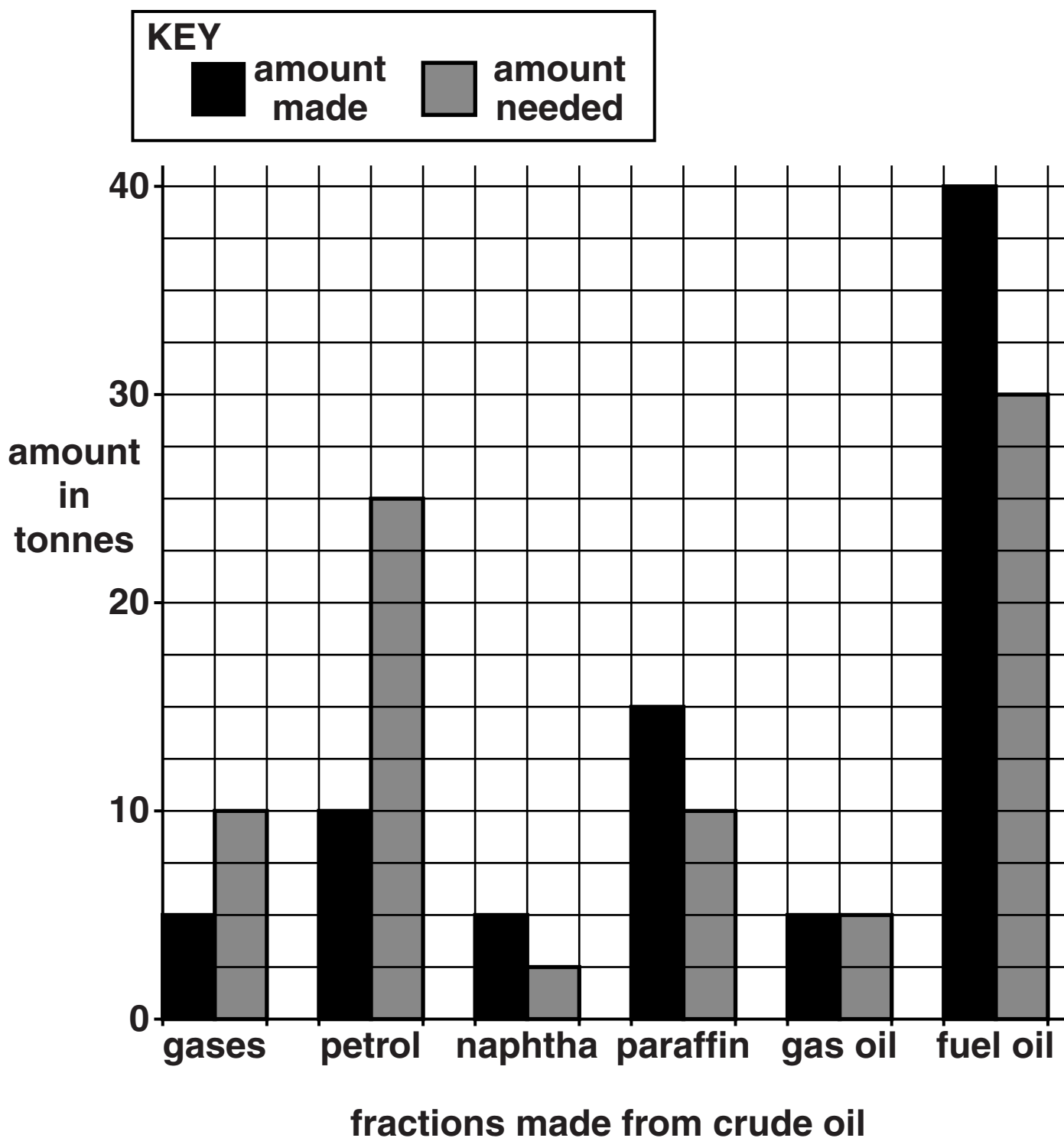
POLYMER	MELTING POINT IN °C	SOLUBILITY IN WATER	SOLUBILITY IN PETROL	IS IT BIODEGRADABLE?
A	80	slightly soluble	insoluble	yes
B	90	slightly soluble	soluble	no
C	120	insoluble	insoluble	yes
D	95	insoluble	soluble	no

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.

[6]

(b) Crude oil needs to be transported by sea 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]

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

(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]

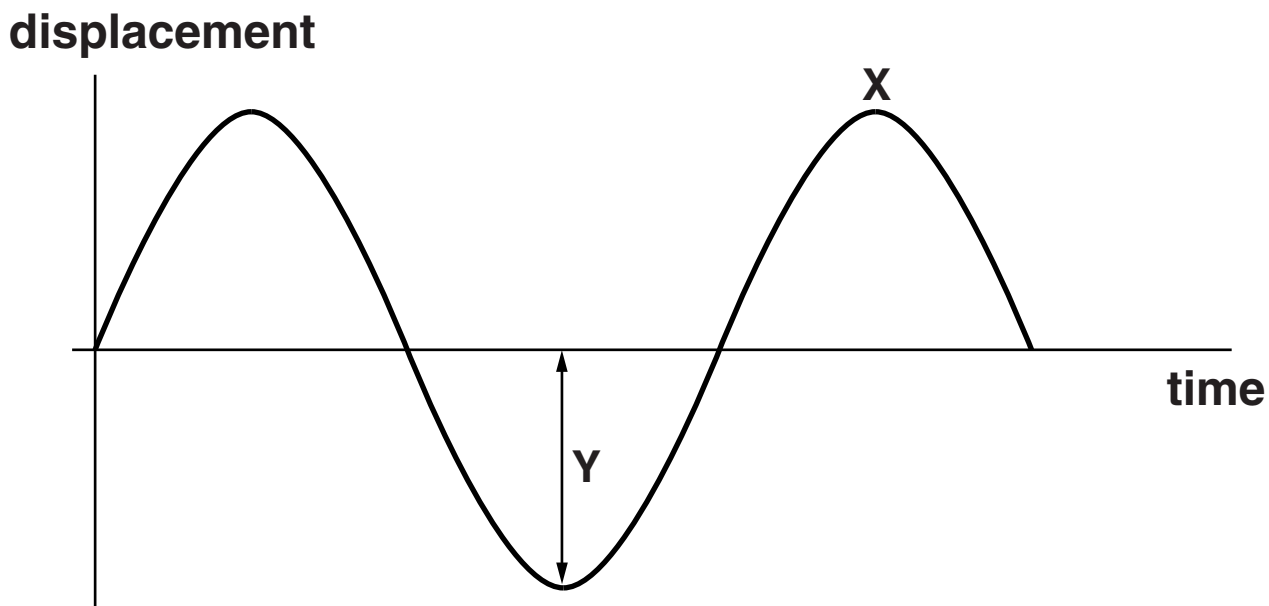
[Total: 7]

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

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]

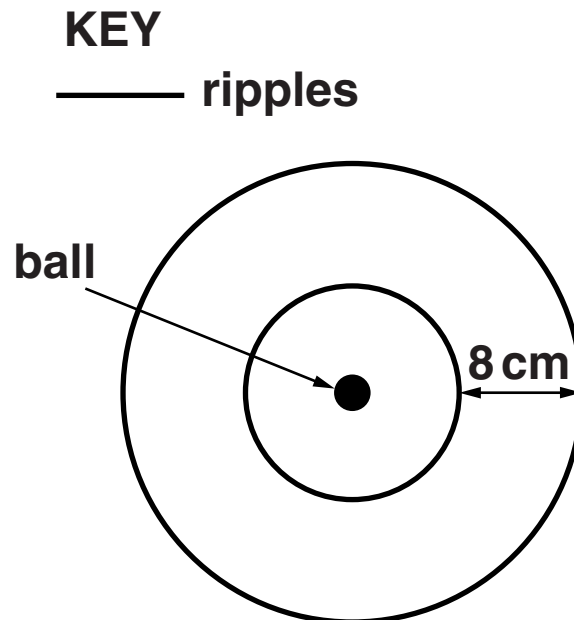
(ii) Write down the name of the feature labelled Y.

_____ [1]

(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.



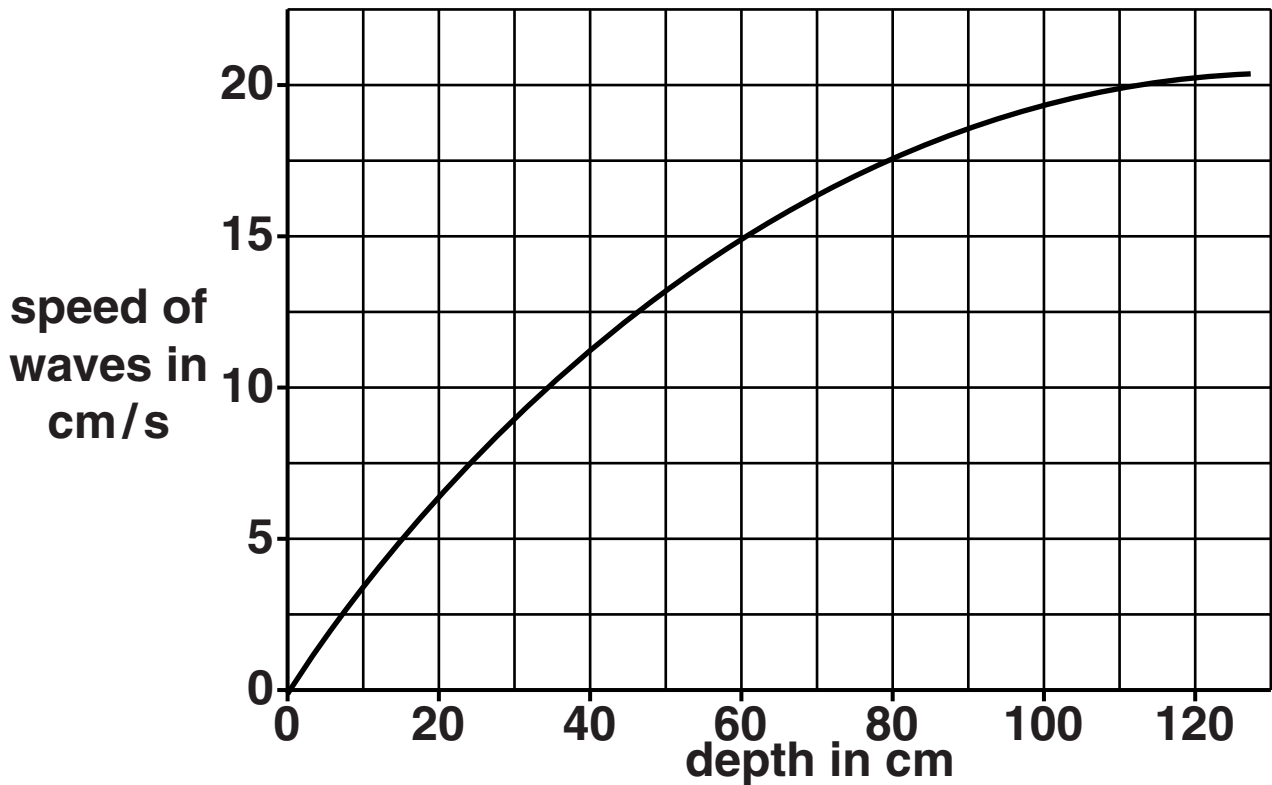
Calculate the speed that the wave moves over the water.

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.

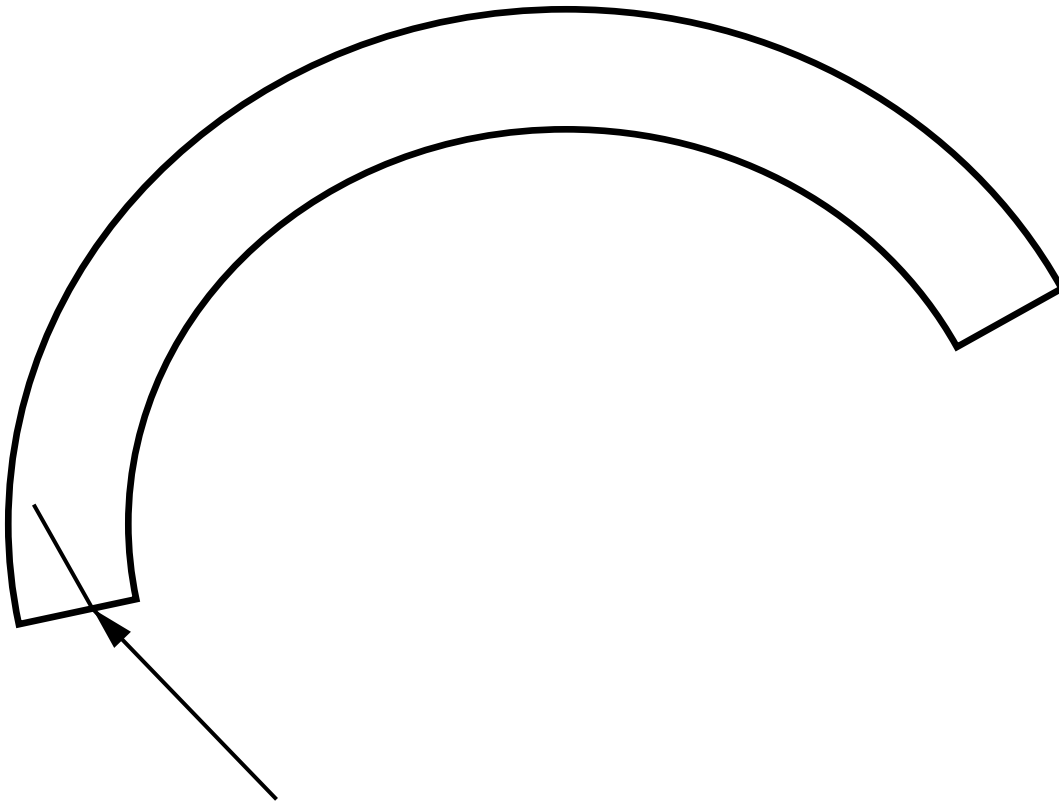
efficiency _____ [2]

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

[Total: 4]

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.

[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

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The Periodic Table of the Elements

		1	2											3	4	5	6	7	0		
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 1 H hydrogen 1 </div>																		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 4 He helium 2 </div>	
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 9 Be beryllium 4 </div>																		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 19 F fluorine 9 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 20 Ne neon 10 </div>
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 23 Na sodium 11 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 24 Mg magnesium 12 </div>													<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 31 P phosphorus 15 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 32 S sulfur 16 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 35.5 Cl chlorine 17 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 40 Ar argon 18 </div>		
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 39 K potassium 19 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 40 Ca calcium 20 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 45 Sc scandium 21 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 48 Ti titanium 22 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 51 V vanadium 23 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 52 Cr chromium 24 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 55 Mn manganese 25 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 56 Fe iron 26 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 59 Co cobalt 27 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 59 Ni nickel 28 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 63.5 Cu copper 29 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 70 Ga gallium 31 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 73 Ge germanium 32 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 75 As arsenic 33 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 79 Se selenium 34 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 80 Br bromine 35 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 84 Kr krypton 36 </div>			
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 85 Rb rubidium 37 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 88 Sr strontium 38 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 89 Y yttrium 39 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 91 Zr zirconium 40 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 93 Nb niobium 41 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 96 Mo molybdenum 42 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [98] Tc technetium 43 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 101 Ru ruthenium 44 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 103 Rh rhodium 45 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 106 Pd palladium 46 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 108 Ag silver 47 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 112 Cd cadmium 48 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 115 In indium 49 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 119 Sn tin 50 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 122 Sb antimony 51 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 127 I iodine 53 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 131 Xe xenon 54 </div>			
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 133 Cs caesium 55 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 137 Ba barium 56 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 139 La* lanthanum 57 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 178 Hf hafnium 72 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 181 Ta tantalum 73 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 184 W tungsten 74 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 186 Re rhenium 75 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 190 Os osmium 76 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 192 Ir iridium 77 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 195 Pt platinum 78 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 197 Au gold 79 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 201 Hg mercury 80 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 204 Tl thallium 81 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 207 Pb lead 82 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> 209 Bi bismuth 83 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [209] Po polonium 84 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [210] At astatine 85 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [222] Rn radon 86 </div>		
		<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [223] Fr francium 87 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [226] Ra radium 88 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [227] Ac* actinium 89 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [261] Rf rutherfordium 104 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [262] Db dubnium 105 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [266] Sg seaborgium 106 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [264] Bh bohrium 107 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [277] Hs hassium 108 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [268] Mt meitnerium 109 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [271] Ds darmstadtium 110 </div>	<div style="border: 1px solid black; padding: 5px; display: inline-block;"> [272] Rg roentgenium 111 </div>	Elements with atomic numbers 112-116 have been reported but not fully authenticated								

* 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.