

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**B711/01**

**GATEWAY SCIENCE  
SCIENCE B**

**Science modules B1, C1, P1  
(Foundation Tier)**

**WEDNESDAY 20 MAY 2015: Afternoon**

**DURATION: 1 hour 15 minutes  
plus your additional time allowance  
MODIFIED ENLARGED 24pt**

<b>Candidate forename</b>		<b>Candidate surname</b>	
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<b>Centre number</b>						<b>Candidate number</b>				
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**Candidates answer on the Question Paper.  
A calculator may be used for this paper.**

**OCR SUPPLIED MATERIALS:**

**A copy of the Periodic Table**

**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**

**The quality of written communication is assessed in questions marked with a pencil ()**.

**A list of equations can be found on pages 4–5.**

**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.**

**Any blank pages are indicated.**

**BLANK PAGE**

## **EQUATIONS**

**energy = mass × specific heat capacity × temperature change**

**energy = mass × specific latent heat**

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

**wave speed = frequency × wavelength**

**power = voltage × current**

**energy supplied = power × time**

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

**distance = average speed × time**

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

**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**

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

**momentum = mass × velocity**

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

$$\text{GPE} = mgh$$

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

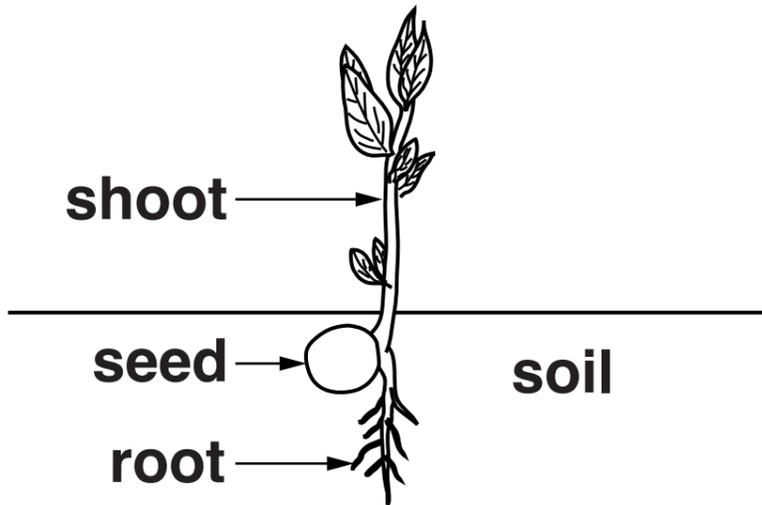
$$\text{resistance} = \frac{\text{voltage}}{\text{current}}$$

Answer ALL the questions.

**SECTION A – Module B1**

**1 This question is about plant growth.**

**(a) When a plant grows, the shoots grow upwards and the roots grow downwards.**



**(i) Explain why plant SHOOTS grow upwards.**

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[2]

**(ii) Write down ONE reason why plant ROOTS grow downwards.**

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[1]

**(b) Ria has dandelion plants growing in the grass on her lawn.**

**When she sprays the lawn with weedkiller only the dandelions are killed.**

**Ria tries to explain why only the dandelions are killed.**

**She says “The dandelions must take in more of the weedkiller because their leaves are wider.”**

**What name describes the kind of statement Ria has made?**

**Put a tick (✓) next to the best answer.**

**hypothesis**     

**observation**     

**prediction**     

**variable**     

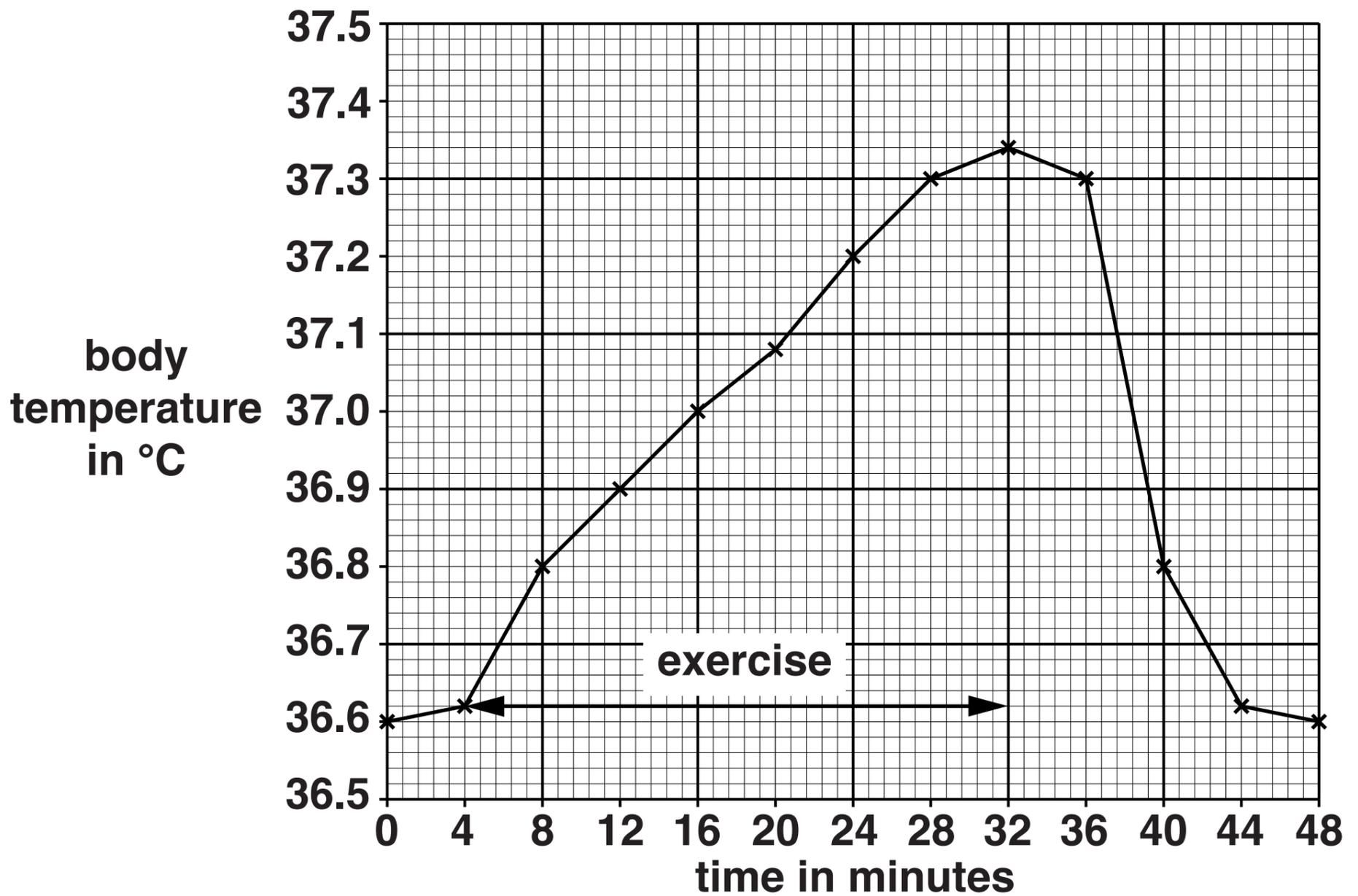
**[1]**

2 Jess and Neil investigate the effect of exercise on body temperature.

Jess measures Neil's body temperature every four minutes for 48 minutes.

Neil exercises for 28 minutes of this time.

The graph shows the change in Neil's body temperature.





**(b) Exercise can help prevent heart disease.**

**Put a tick (✓) next to ONE OTHER way to reduce the risk of heart disease.**

**Eat a diet with no proteins.**

**Eat less salt.**

**Eat only saturated fats.**

**Increase body mass.**

**[1]**

**(c) Energy is needed for exercise.**

**Which type of food provides energy for the body?**

**Put a ring around the correct answer.**

**CARBOHYDRATES**

**FIBRE**

**MINERALS**

**VITAMINS**

**[1]**

- 3 Jake wants to find out how much protein he should eat each day.

He finds information from two different sources.

### SOURCE 1

The table shows the amount of protein people of different ages should eat each day.

AGE GROUP	AMOUNT OF PROTEIN IN g
Infants	10
Teenage males	52
Teenage females	46
Adult males	56
Adult females	46

### SOURCE 2

Your estimated average daily intake of protein can be calculated using the formula.

$$\text{EAR in g} = 0.6 \times \text{body mass in kg}$$

(EAR) Estimated Average Requirement

- (a) Explain why proteins are needed in the diet.

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[1]

**(b) Jake is a teenage male. He has a mass of 70 kg.**

**The amounts of protein recommended by Source 1 and Source 2 are different.**

**(i) Calculate Jake's EAR.**

**Use your calculation to decide which source recommends that Jake eats the MOST protein.**

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**[2]**

**(ii) Suggest TWO reasons why the recommended amounts of protein are different.**

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**[2]**

**4 (a) Multiple sclerosis affects the nervous system.**

**(i) Which TWO parts of the body make up the central nervous system?**

\_\_\_\_\_ and \_\_\_\_\_ **[1]**

**(ii) The nervous system sends NERVE IMPULSES around the body.**

**Finish the sentence about nerve impulses.**

**Nerve impulses are \_\_\_\_\_**

**signals sent along neurones. **[1]****

**(b) Read this information about multiple sclerosis and cannabis.**

**People with a medical condition called multiple sclerosis (MS) often have very painful symptoms.**

**A study of more than 600 MS patients has shown that taking cannabis can relieve some of the symptoms.**

**A scientist working on the trial says that the study has made NHS prescribing of cannabis-based drugs more likely.**

**In some countries, MS patients smoke cannabis mixed with tobacco. It is also possible to take cannabis without mixing it with tobacco. In other countries the possession of cannabis is illegal.**

**Smoking cannabis has many risks.**

**The risks to MS patients taking cannabis mixed with tobacco could be reduced.**

**Suggest and explain how the risks to MS patients taking cannabis could be reduced.**

**Use the information to help you.**

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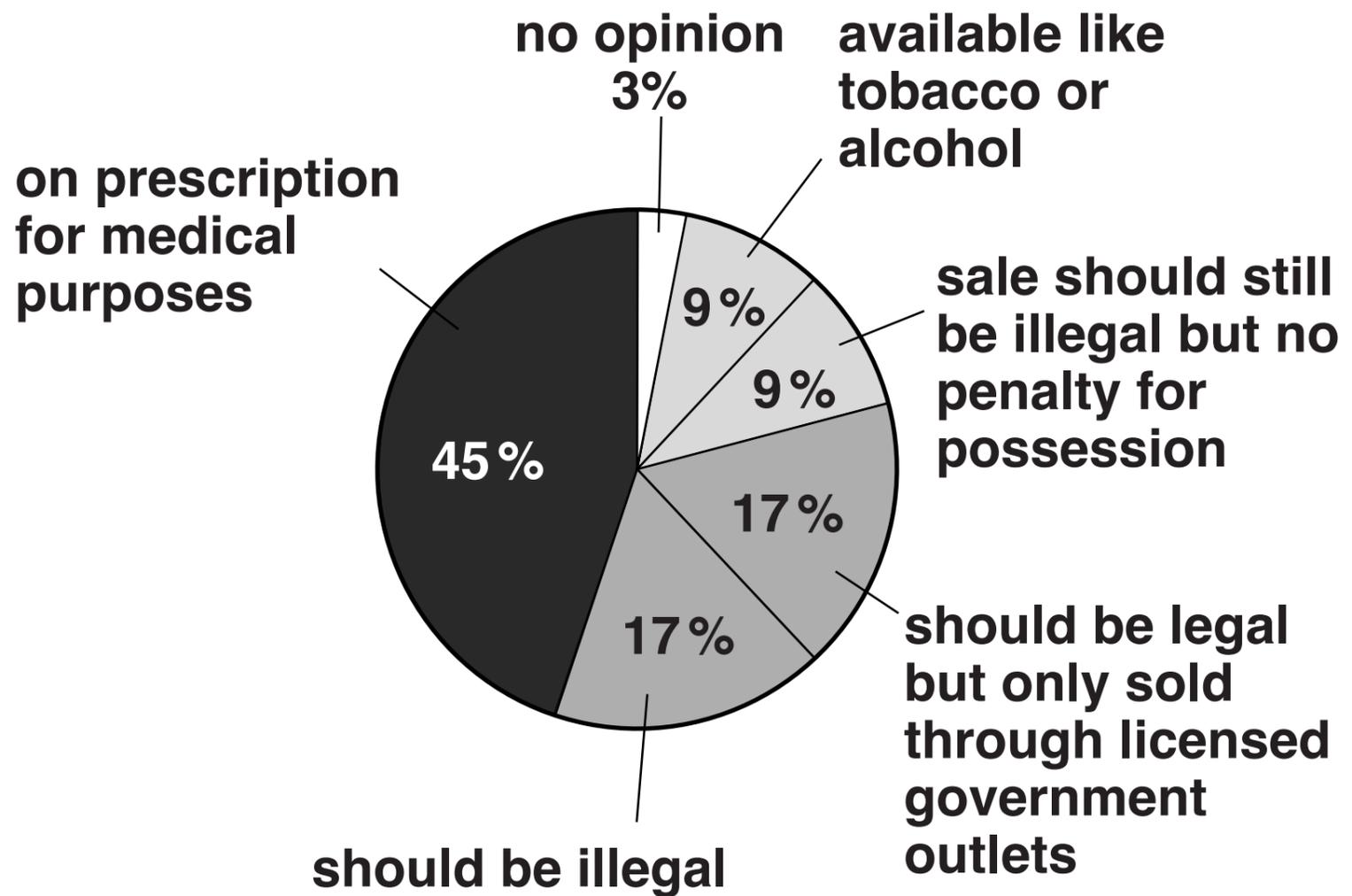
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**[3]**

(c) Some people think cannabis should be made legal in the United Kingdom.

Look at the chart. It shows the results of an opinion poll about making cannabis legal.



(i) What total percentage of those asked think cannabis should be an illegal drug?

answer \_\_\_\_\_ % [1]

(ii) What does the chart show about people's opinions on cannabis use?

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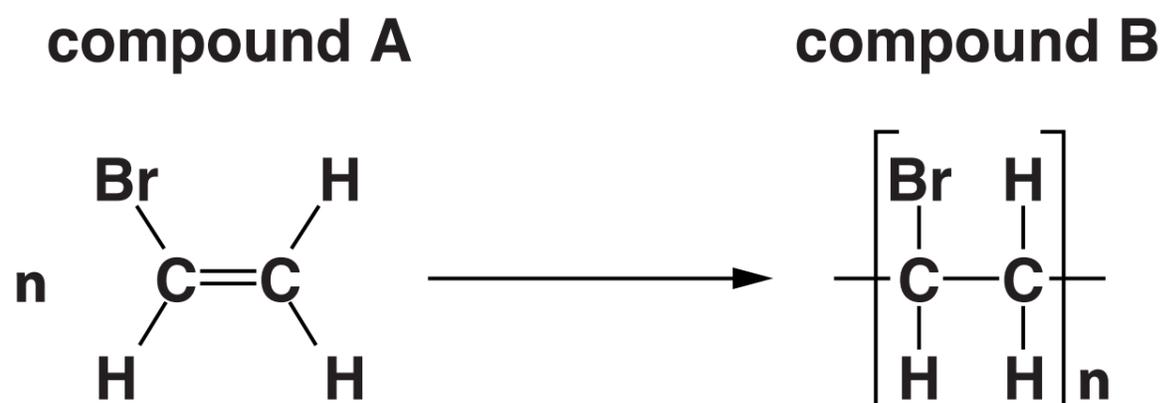
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 [2]

## SECTION B – Module C1

5 This question is about carbon compounds.



(a) Look at the displayed formula of compound A.

Compound A is NOT a hydrocarbon.

Explain why.

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[1]

**(b) Compound A is changed into compound B in a chemical reaction.**

**What is the name of this TYPE of chemical reaction?**

**Choose from the list.**

**BROMINATION**

**COMBUSTION**

**DENATURING**

**POLYMERISATION**

**THERMAL DECOMPOSITION**

\_\_\_\_\_ [1]

**(c) Compound A is called bromoethene.**

**Write down the NAME of compound B.**

\_\_\_\_\_ [1]

**6 Louise buys a new bottle of perfume.**

**(a) Two properties of the perfume are that it smells nice and evaporates easily.**

**Write down TWO OTHER important properties that the perfume must have.**

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**[2]**

**(b) Louise's perfume contains a chemical called an ESTER.**

**Complete the WORD EQUATION for the reaction used to make an ester.**

**\_\_\_\_\_ + alcohol → ester + water**

**[1]**

**7 Duncan investigates the combustion of four different fuels.**

**He burns the same amount of fuel in each experiment.**

**Look at his results.**

<b>Fuel</b>	<b>Is carbon dioxide made?</b>	<b>Is carbon monoxide made?</b>	<b>Is soot made?</b>	<b>Energy given out in J</b>
<b>A</b>	✓	✗	✗	<b>4200</b>
<b>B</b>	✓	✓	✗	<b>2800</b>
<b>C</b>	✗	✓	✓	<b>1100</b>
<b>D</b>	✓	✗	✗	<b>3400</b>

**(a) Duncan concludes that INCOMPLETE combustion happened in the experiment with fuel C.**

**Is he correct?**

**Use information from the table to explain your answer.**

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**[3]**

**(b) In each experiment Duncan tests to see if CARBON DIOXIDE is made.**

**Write about how Duncan tests for carbon dioxide.**

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**[2]**

**(c) Fuel A is ethanol.**

**Ethanol burns in oxygen.**

**Carbon dioxide and water are made.**

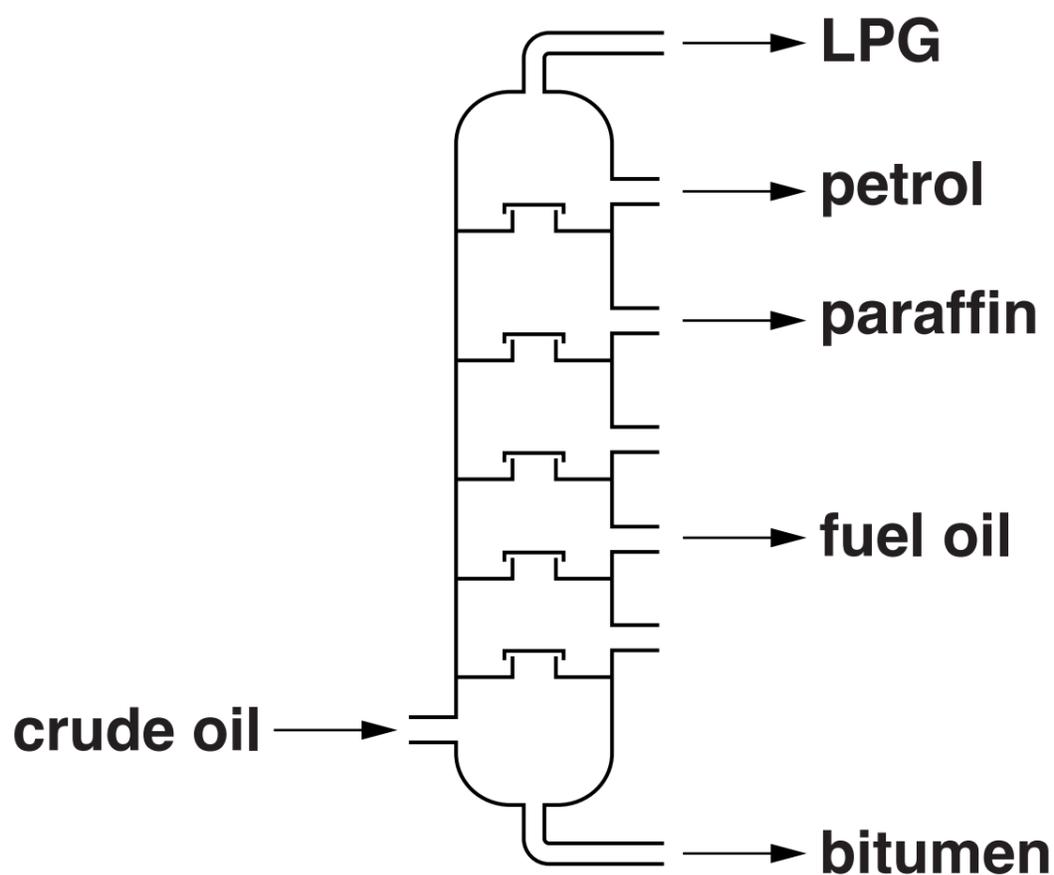
**Write the WORD EQUATION for this reaction.**

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**[1]**

**8 This question is about crude oil.**

**Crude oil can be separated into useful substances called fractions.**



**(a) What is the name of the process that separates crude oil into fractions?**

\_\_\_\_\_ [1]

**(b) LPG contains butane gas.**

**LPG also contains ANOTHER gas.**

**Which gas?**

**Choose from the list.**

**ETHENE**

**NITROGEN**

**OXYGEN**

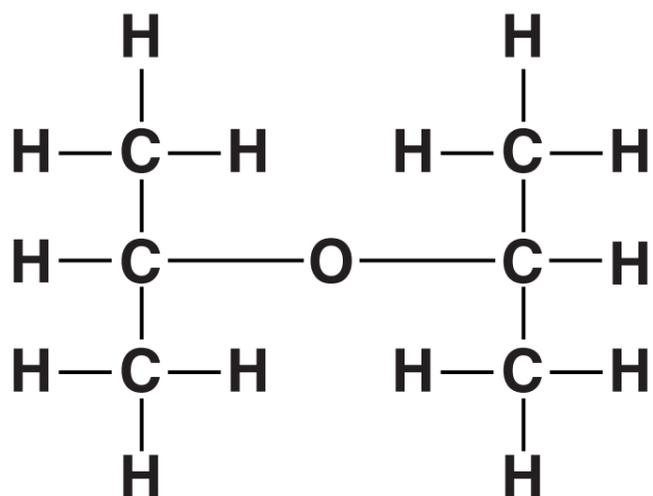
**PROPANE**

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**[1]**

(c) DIPE is an additive sometimes put into petrol to improve combustion in a car engine.

Look at the displayed formula for DIPE.



Complete the table to show the numbers of each type of atom in one molecule of DIPE.

Atom	Number
C	_____
H	_____
O	_____

[2]

**(d) Not enough petrol is made from crude oil to meet world demand.**

**Oil refineries make more petrol using a process called CRACKING.**

**Write about how cracking makes more petrol from other hydrocarbons.**

**Include the conditions needed for cracking.**

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**[3]**

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**9 Poly(ethene) is a polymer that is used in two forms.**

**These are low density poly(ethene) (LDPE) and high density poly(ethene) (HDPE).**

**Look at the table.**

**It gives some information about LDPE and HDPE.**

	<b>LDPE</b>	<b>HDPE</b>
<b>Density in g/cm<sup>3</sup></b>	<b>0.91</b>	<b>0.97</b>
<b>Maximum usable temperature in °C</b>	<b>80</b>	<b>120</b>
<b>Relative strength</b>	<b>11.8</b>	<b>31.4</b>
<b>Relative flexibility</b>	<b>flexible</b>	<b>rigid</b>

**LDPE is used for making plastic carrier bags.**

**HDPE is used for making water pipes.**

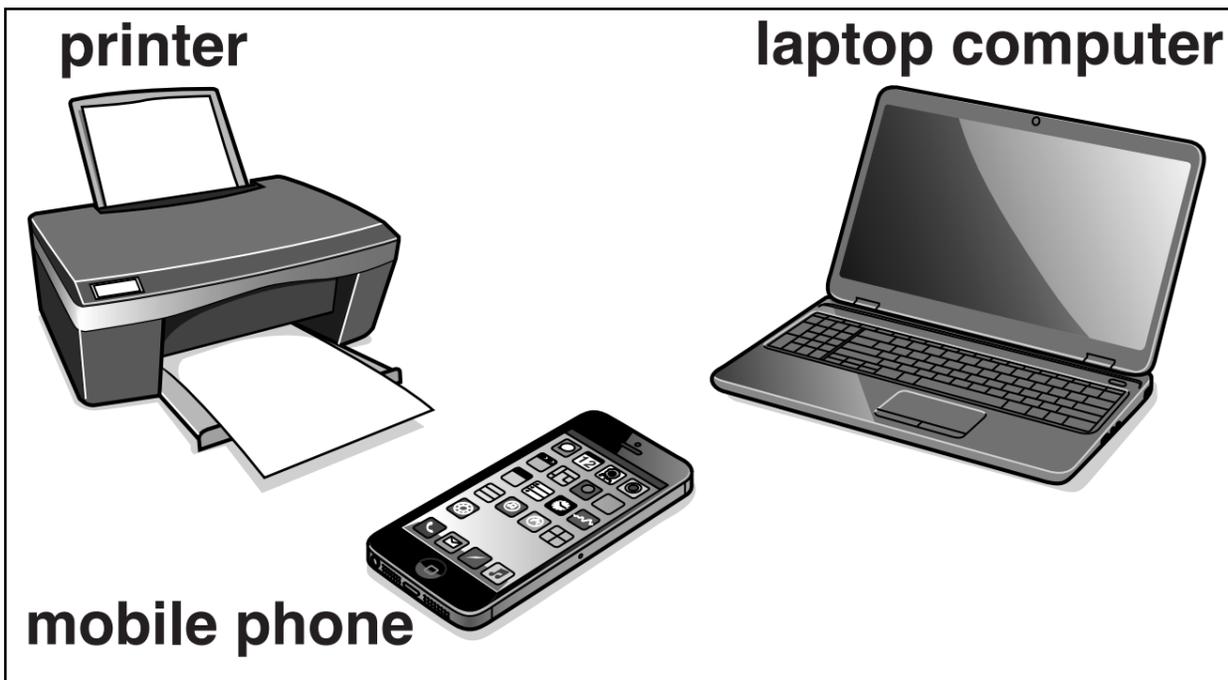




**SECTION C – Module P1**

**10 OCRA is an advertising company.**

**Here is a picture from one of their adverts.**



**The advert is about the advantages of using WIRELESS TECHNOLOGY.**

**(a) Write about the ADVANTAGES of wireless communication between the devices in the picture.**

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**[2]**

**(b) What does wireless technology use for communication between devices?**

**Choose the BEST answer from**

**ELECTRICITY**

**ELECTROMAGNETIC RADIATION**

**NUCLEAR RADIATION**

**SOUND**

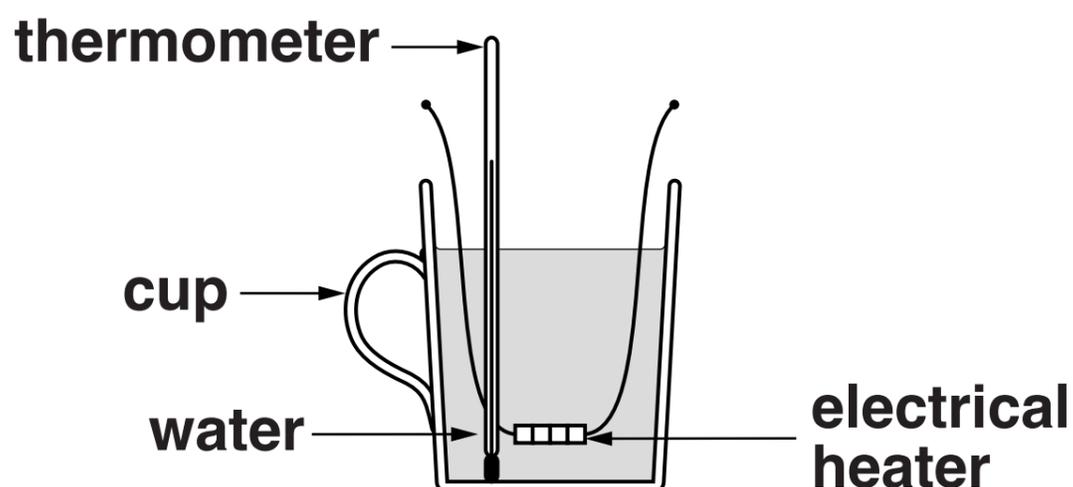
**THERMAL ENERGY**

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**[1]**

**11 Emily does an experiment to calculate the energy needed to change the temperature of water.**

**(a) Here is the apparatus she uses.**



**Emily does the experiment three times.**

**Each time she changes the temperature of the water by different amounts.**

**Look at her results.**

<b>Mass of water in kg</b>	<b>Temperature increase in °C</b>	<b>Specific heat capacity of water in J/kg °C</b>	<b>Energy in J</b>
<b>0.2</b>	<b>40</b>	<b>4200</b>	<b>33600</b>
<b>0.2</b>	<b>30</b>	<b>4200</b>	<b>25200</b>
<b>0.2</b>	<b>20</b>	<b>4200</b>	



**(b) Emily thinks that her results will change if she insulates the cup.**

**(i) Write down TWO different ways she could insulate the cup.**

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**[2]**

**(ii) Explain why bubbles of air in a material makes it a better insulator.**

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**[1]**

**(iii) Emily measures how long it takes to increase the temperature of this water by  $60^{\circ}\text{C}$ . This takes 5 minutes.**

**She repeats this experiment with the same mass of water in an insulated cup.**

**Suggest what effect this has on the time taken to heat the water by  $60^{\circ}\text{C}$ .**

**Explain your answer.**

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**[2]**

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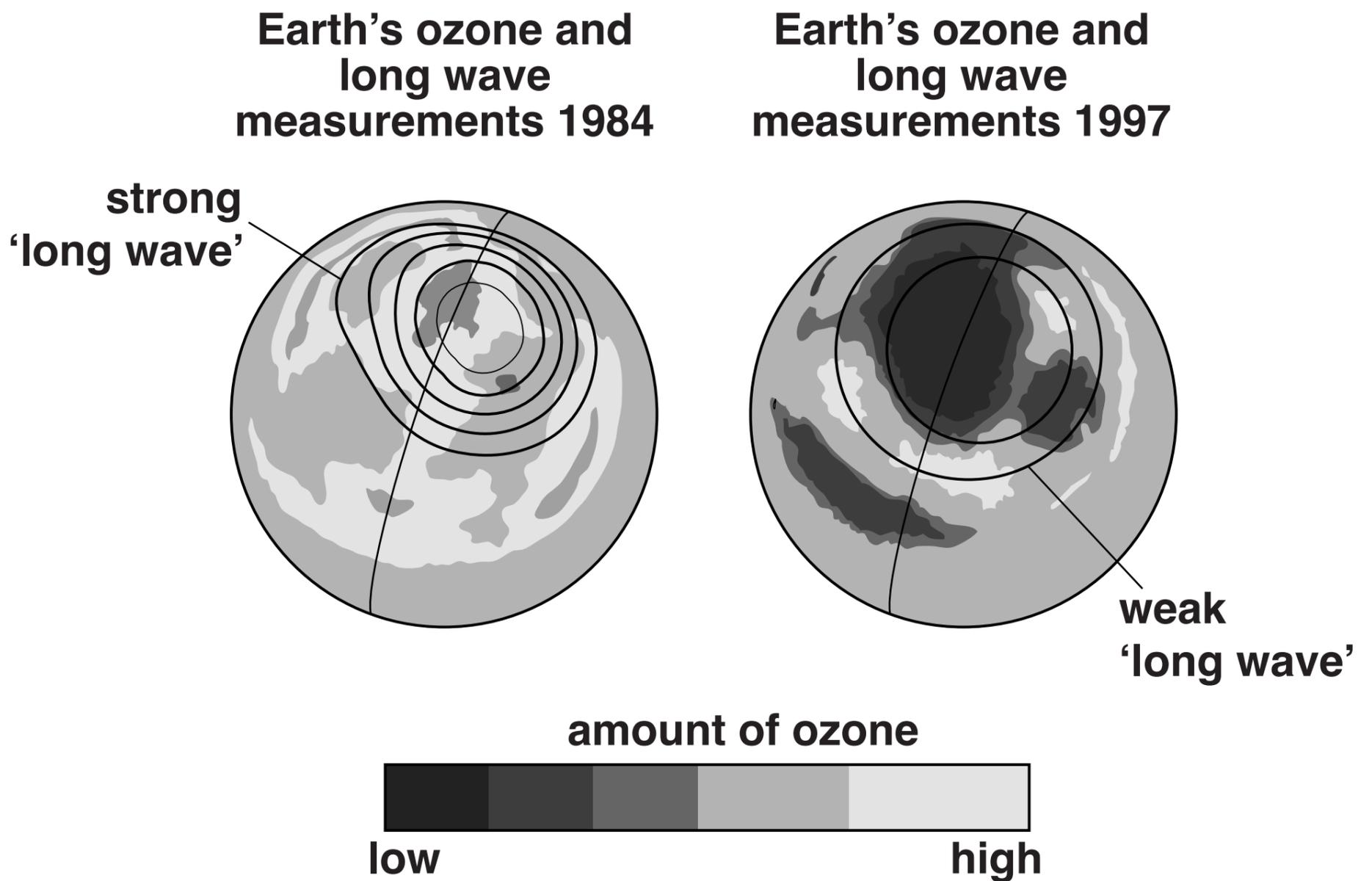
**12 Scientists have measured the amount of ozone in the upper atmosphere.**

**They have also measured the strength of 'long waves'.**

**'Long waves' are bands of energy found in the upper atmosphere.**

**They help to keep the temperature of the upper atmosphere constant.**

**Here are the ozone and long wave measurements for the years 1984 and 1997.**



- (a) Scientists believe that the strength of the ‘long waves’ and the amount of ozone in the upper atmosphere are linked.**

**Use the information to explain why scientists think there is a link.**

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**[2]**

- (b) Pollution from CFCs has increased the size of the hole in the ozone layer over Antarctica.**

**This has increased the amount of ultraviolet (UV) radiation reaching the surface of the Earth.**

- (i) Describe how increased amounts of UV radiation damage human skin AND eyes.**

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**[2]**

- (ii) Describe TWO ways to reduce damage to human skin by UV radiation.**

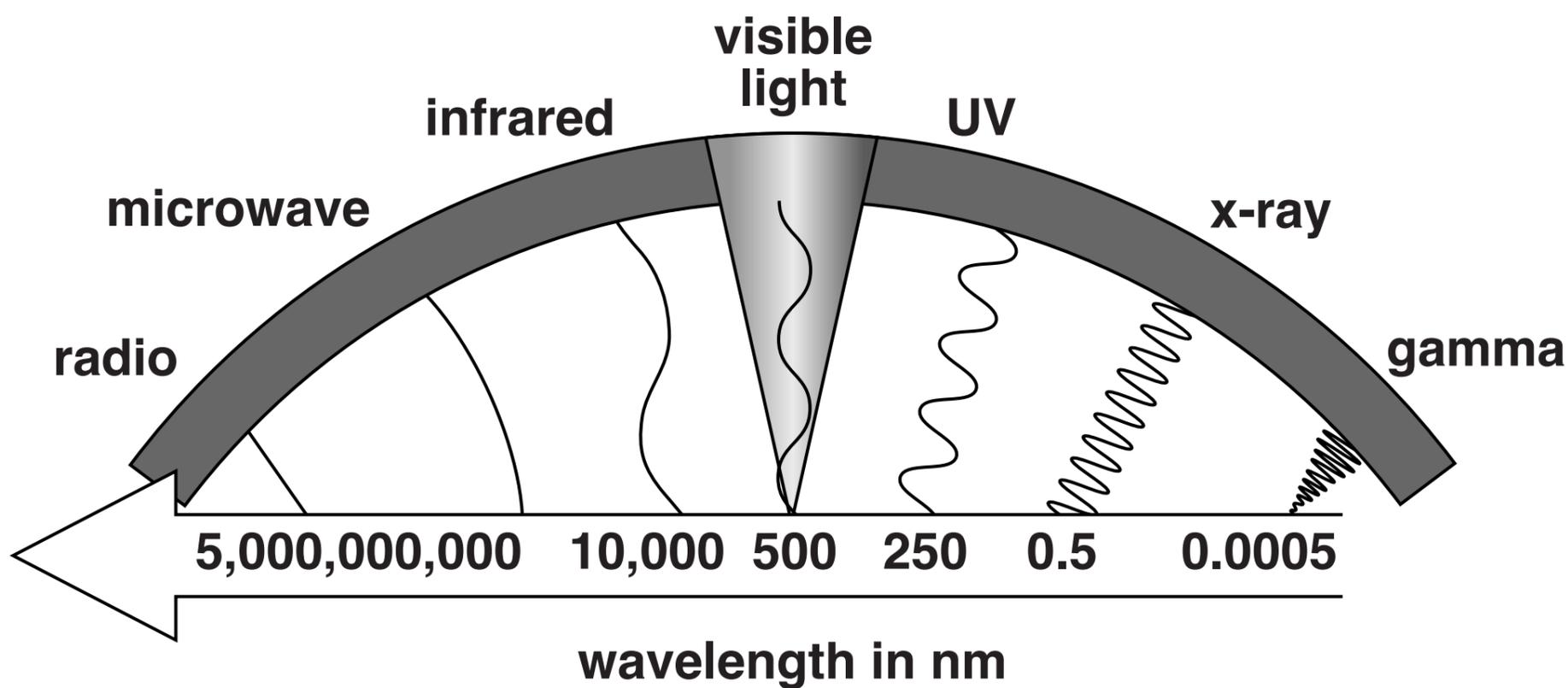
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**[2]**

13 Tobias finds information about microwaves and infrared radiation on the internet.



(a) Use the diagram to describe ONE difference between microwaves and infrared radiation.

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[1]

**(b) Microwaves and infrared radiation have different properties.**

**Next to each statement write either TRUE or FALSE.**

**The first one has been done for you.**

**Infrared radiation heats the surface of food.**

**TRUE**

**Infrared radiation is absorbed by a dull surface.**

**Infrared radiation is reflected from a shiny surface.**

**Microwaves cause cooling when absorbed by water.**

**[2]**

**(c) Infrared radiation can travel along an optical fibre.**

**Look at the table. It shows some properties of materials A, B, C and D.**

<b>Material</b>	<b>Does total internal reflection happen?</b>	<b>Cost per metre in £</b>
<b>A</b>	<b>yes</b>	<b>83</b>
<b>B</b>	<b>no</b>	<b>24</b>
<b>C</b>	<b>yes</b>	<b>45</b>
<b>D</b>	<b>no</b>	<b>80</b>

**Which material is the best for making optical fibres?**

**Choose from A B C D.**

\_\_\_\_\_

**Explain your answer.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**[2]**

**END OF QUESTION PAPER**