

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**B711/01**

**GATEWAY SCIENCE  
SCIENCE B**

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

**WEDNESDAY 24 MAY 2017: 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. If additional space is required, you should use the lined page(s) at the end of this booklet. The question number(s) must be clearly shown.**

## **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.**

## **EQUATIONS**

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

**energy = mass × specific latent heat**

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

**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**

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

**GPE = mgh**

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

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

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**Answer ALL the questions.**

**SECTION A – Module B1**

**1 (a) Cholera is an INFECTIOUS disease.**

**What is the cause of cholera?**

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

**bacteria**

☐

**fungi**

☐

**protozoa**

☐

**viruses**

☐

**[1]**

**(b) Cancer is a NON-INFECTIOUS disease.**

**(i) Describe the difference between infectious and non-infectious diseases.**

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**[1]**

**(ii) Drugs used to treat cancer are often only available on prescription.**

**Write down ONE reason why some drugs are only available on prescription.**

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**[1]**

**(iii) Look at the table.**

**It shows the factors that cause cancer.**

<b>Factor</b>	<b>Percentage</b>
<b>other</b>	<b>26%</b>
<b>diet</b>	<b>35%</b>
<b>tobacco</b>	<b>30%</b>
<b>alcohol</b>	<b>3%</b>
<b>genes</b>	<b>6%</b>

**Write down TWO changes to a person's lifestyle that would BEST reduce their risk of getting cancer.**

**1** \_\_\_\_\_  
\_\_\_\_\_

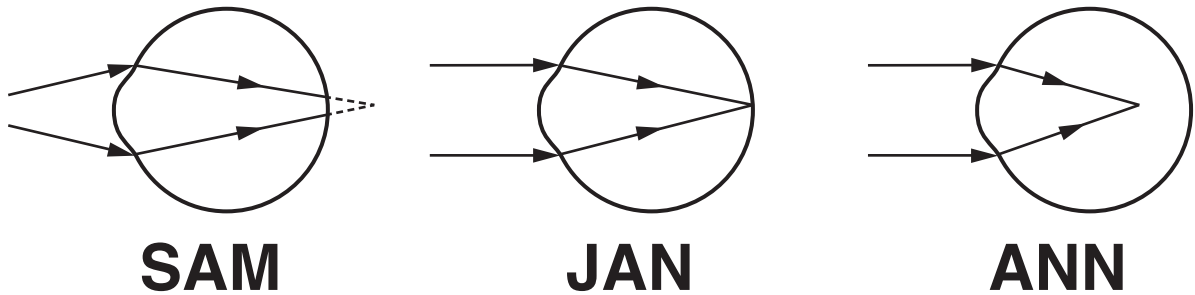
**2** \_\_\_\_\_  
\_\_\_\_\_

**[2]**

## **2 Sam, Jan and Ann have different vision.**

**Look at the diagrams.**

**They show how light is focused when it enters their eyes.**



**JAN'S vision is normal.**

**SAM and ANN have different problems with their vision.**

**Describe the problems that Sam and Ann have with their vision.**

**Explain what could be wrong in their eyes to cause each of their problems.**



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

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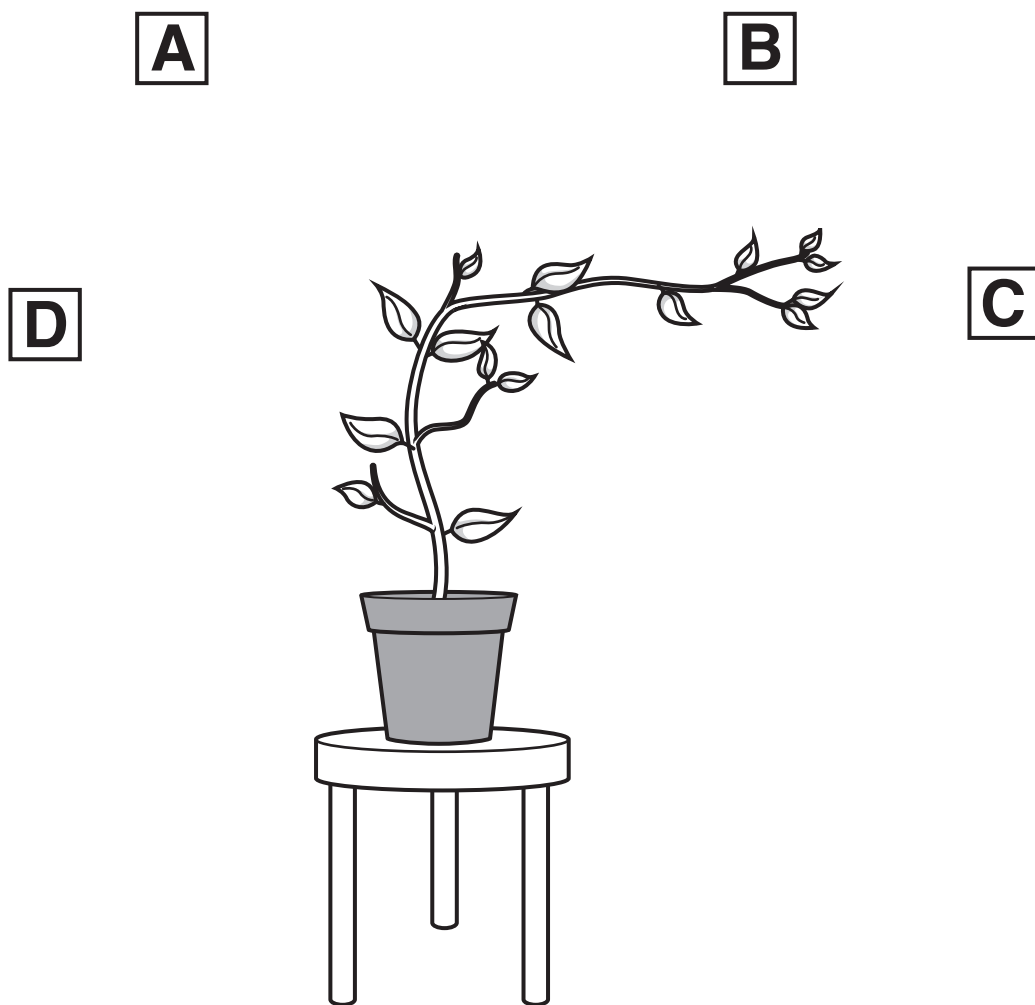
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**[6]**

- 3 (a) The picture shows a plant growing on top of a table.

The plant is in a room with one window.

This window is the only light source.



**Write down the letter which shows the position of the window.**

**answer \_\_\_\_\_ [1]**

**(b) Jill wants to grow new plants from her favourite plant.**

**(i) She knows that chemicals produced by plants can help speed up growth.**

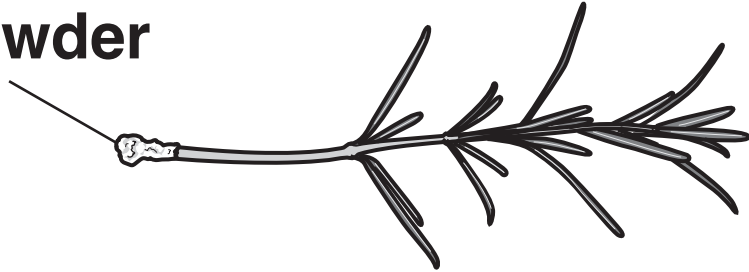
**Write down the name of the TYPE of chemical produced by plants that speeds up plant growth.**

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

**(ii) Jill takes cuttings from a plant.**

**She puts a white rooting powder on the cuttings.**

**rooting powder  
on cutting**



**Jill then puts the cuttings into compost.**

**Jill uses 'Start-Root' rooting powder because she thinks it is the best.**

**Look at the table.**

**It shows the effects of different rooting powders on cuttings.**

<b>Rooting powder used</b>	<b>Mean number of roots per cutting after ten days</b>	<b>Mean root length after ten days in mm</b>
<b>none</b>	<b>7.6</b>	<b>22.1</b>
<b>Rootz-It</b>	<b>8.9</b>	<b>30.3</b>
<b>Roo-Ting</b>	<b>12.5</b>	<b>32.4</b>
<b>Start-Root</b>	<b>12.8</b>	<b>28.3</b>

**Is ‘Start-Root’ the best rooting powder?**

**Give reasons for your answer.**

**Use data from the table to support your answer.**

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**[2]**

#### 4 Look at the table below.

It shows information about the meat consumption per person in five countries.

Meat consumption per person in kg per year				
Year				
Country	1960	1980	2002	Mean
China	3.8	14.6	52.4	
India	3.7	3.7	5.2	4.2
Kenya	18.6	17.4	14.3	16.8
UK	69.8	71.0	79.6	73.5
USA	89.2	108.1	124.8	107.4

- (a) (i) Calculate the mean meat consumption per person in China for the years 1960, 1980 and 2002.**

**mean = \_\_\_\_\_  
kg per year [1]**

- (ii) In which country are people MOST LIKELY to lack protein in their diet?**

**Explain your answer using data from the table.**

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_ **[2]**

**(b) Write down TWO reasons why protein is needed in the diet.**

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**[2]**

**5 This question is about temperature control.**

**Tom is sledging in the snow.**

**The outside temperature is 2°C.**

**(a) Tom's body must have a temperature 35°C higher than this outside temperature.**

**Explain why.**

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**[2]**

**(b) Tom has an accident and needs first-aid.**

**His body can lose heat very quickly and this is dangerous.**

**Look at the guidance for first-aiders to help prevent injured people getting too cold.**

**Wrap them in blankets.**

**Get them to move around if possible.**

**Give them warm sugary drinks or high energy foods, such as chocolate.**

**Do NOT massage their limbs.**

**Write about how this guidance helps produce heat or keep heat in the body.**

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**[3]**

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## **SECTION B – Module C1**

**6 (a) Nick is painting his kitchen.**

**One reason Nick paints his kitchen is to put a decorative coating on the walls.**

**Write down ONE OTHER reason why Nick paints his kitchen.**

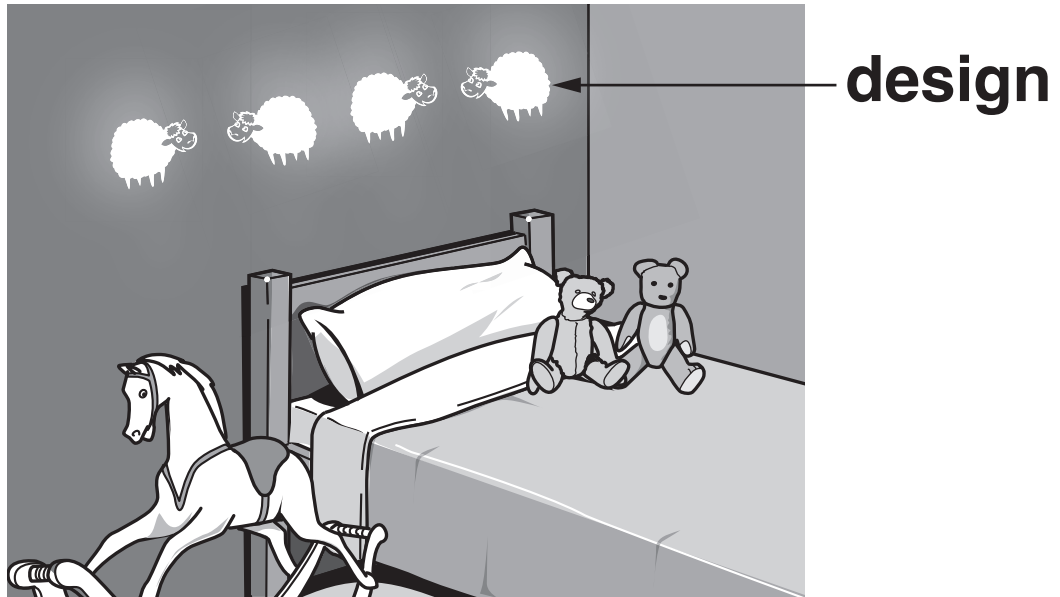
\_\_\_\_\_ **[1]**

**(b) Nick uses EMULSION PAINT.**

**Describe how emulsion paint dries.**

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

**(c) Nick also paints his granddaughter's bedroom.**



**He wants a design to ‘glow’ on the walls at night when the room is dark.**

**What type of pigment should Nick's paint contain?**

**Choose from the list.**

**biodegradable**

**breathable**

**finite**

**phosphorescent**

**thermochromic**

**answer \_\_\_\_\_ [1]**

**(d) Look at the tables showing the ingredients in three types of paint.**

**A**

<b>Ingredients</b>	<b>Percentage</b>
<b>other ingredients</b>	<b>20%</b>
<b>solvent</b>	<b>40%</b>
<b>pigment</b>	<b>20%</b>
<b>polymer</b>	<b>20%</b>

**B**

<b>Ingredients</b>	<b>Percentage</b>
<b>other ingredients</b>	<b>15%</b>
<b>solvent</b>	<b>10%</b>
<b>binding medium</b>	<b>50%</b>
<b>pigment</b>	<b>25%</b>

**C**

<b>Ingredients</b>	<b>Percentage</b>
<b>other ingredients</b>	<b>15%</b>
<b>binding medium</b>	<b>40%</b>
<b>solvent</b>	<b>30%</b>
<b>pigment</b>	<b>15%</b>

**Which paint would you expect to stick most easily to the wall?**

**Explain your choice.**

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**[2]**

**7 Look at the information about five different fuels.**

<b>Fuel</b>	<b>Cost per litre in pence</b>	<b>Relative energy content per litre</b>	<b>Relative mass of carbon dioxide made per kJ</b>
<b>Butane</b>	<b>136.96</b>	<b>7.97</b>	<b>0.244</b>
<b>Gas oil</b>	<b>47.66</b>	<b>10.40</b>	<b>0.341</b>
<b>Kerosene</b>	<b>30.98</b>	<b>9.80</b>	<b>0.300</b>
<b>LPG</b>	<b>37.50</b>	<b>6.66</b>	<b>0.244</b>
<b>Propane</b>	<b>74.24</b>	<b>7.07</b>	<b>0.244</b>

- (a) Liz thinks that GAS OIL would be the best fuel to heat her house.**

**Is she right?**

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

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**[2]**

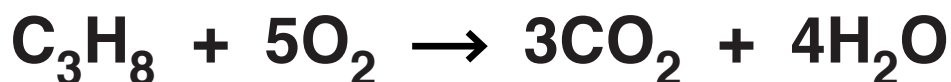
- (b) Write down TWO OTHER factors, apart from those given in the table, which Liz needs to consider when choosing a fuel for her house.**

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**[2]**

- (c) Look at the **BALANCED SYMBOL** equation for the combustion of propane.



- (i) Write down the **FORMULA** for a **PRODUCT** in this reaction.

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

- (ii) Explain how you can tell that the equation is balanced.

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

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**8 Jamie wants to buy a new pair of walking boots.**



**(a) Look at the table. It gives information about three materials.**

<b>Material</b>	<b>Is it waterproof?</b>	<b>Is sweat absorbed?</b>	<b>Is it breathable?</b>
<b>A</b>	<b>yes</b>	<b>escapes through material</b>	<b>yes</b>
<b>B</b>	<b>yes</b>	<b>not absorbed</b>	<b>no</b>
<b>C</b>	<b>no</b>	<b>absorbed</b>	<b>no</b>

**Which material is most suitable for a pair of walking boots?**

**Explain your choice.**

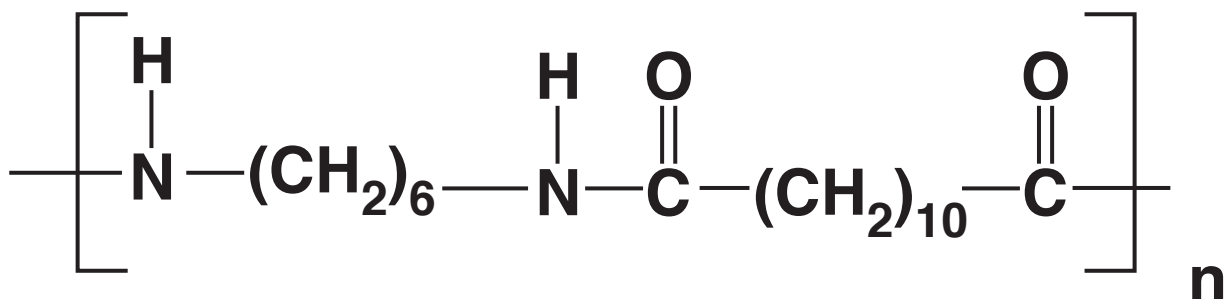
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**[2]**

**(b) Material B is nylon. Look at the chemical formula for nylon.**



**(i) How many DIFFERENT ELEMENTS are in the chemical formula for nylon?**

**answer** \_\_\_\_\_ **[1]**

**(ii) What type of compound is nylon?**

**Choose from the list.**

**alkene**

**hydrocarbon**

**monomer**

**polymer**

**saturated**

**answer \_\_\_\_\_ [1]**

**9 Chemicals called ESTERS can be used to make perfumes or used as solvents.**

**(a) Perfumes have a pleasant smell.**

**Perfumes must not be toxic.**

**Write down TWO OTHER properties that perfumes must have.**

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**[2]**

**(b) Perfumes must be thoroughly tested before they can be sold.**

**In the past, perfumes were tested on animals.**

**Testing on animals is now banned in the EU.**

**Write about TWO different views that people have about testing perfumes on animals.**

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**[2]**

**(c) Kevin investigates five different solvents.**

**He wants to find the best solvent for removing a grease stain from his school blazer.**

<b>Solvent</b>	<b>How easily does it evaporate? (10 = good, 1 = poor)</b>	<b>How effective is it at dissolving grease? (10 = good, 1 = poor)</b>	<b>Is it toxic?</b>	<b>Is it flammable?</b>
<b>A</b>	<b>8.0</b>	<b>1.6</b>	<b>✓</b>	<b>✓</b>
<b>B</b>	<b>5.6</b>	<b>4.5</b>	<b>✓</b>	<b>✓</b>
<b>C</b>	<b>7.8</b>	<b>4.2</b>	<b>x</b>	<b>✓</b>
<b>D</b>	<b>10.0</b>	<b>4.5</b>	<b>x</b>	<b>x</b>
<b>E</b>	<b>6.8</b>	<b>5.1</b>	<b>✓</b>	<b>✓</b>

**Explain what is meant by a solvent.**

**Explain which solvent would be best for Kevin to use to remove the grease from his blazer.**

**Use information from the table to help you. [6]**



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

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## SECTION C – Module P1

10 There are seven types of electromagnetic wave.

radio waves	wave A	infrared	wave B	ultraviolet	X-rays	gamma rays
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**(a) Wave A is used in mobile phone communication.**

**Write down the name of this TYPE of electromagnetic wave.**

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

**(b) Wave B can travel along optical fibres by reflection.**

**Write down the name of this TYPE of electromagnetic wave.**

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

**(c) A radio wave has a frequency of 3 000 000 Hz.**

**It has a wavelength of 100 m.**

**(i) Calculate the speed of this radio wave.**

**answer**

\_\_\_\_\_ **m/s. [2]**

**(ii) Complete the sentences about wave A.**

**Choose from**

**higher than      lower than      the same as**

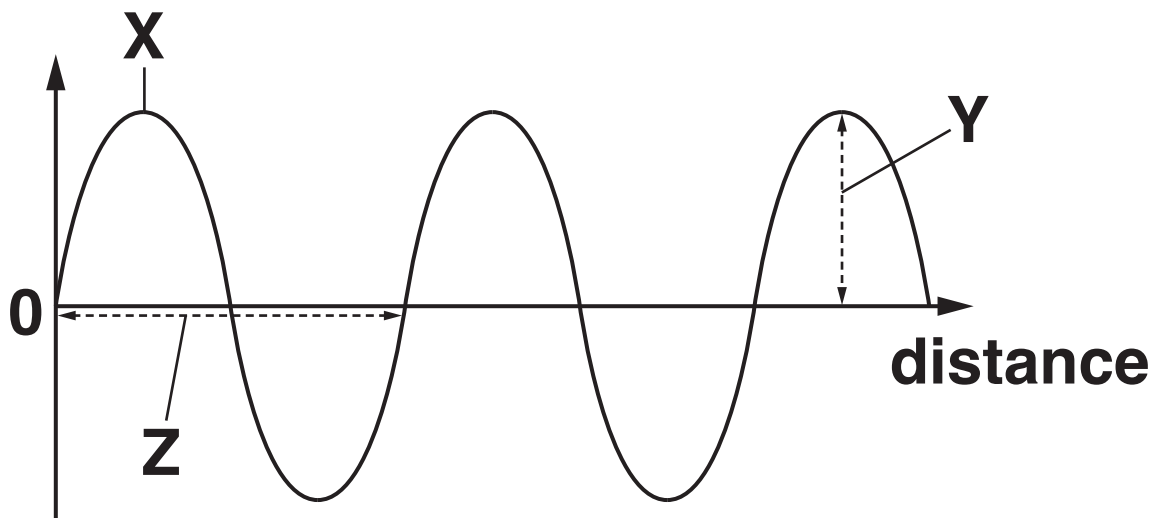
**The frequency of wave A is**

**\_\_\_\_\_ the  
radio wave.**

**The speed of wave A is**

**\_\_\_\_\_ the  
radio wave. [2]**

**(d) Three features X, Y and Z of an electromagnetic wave are shown in the diagram.**



**Write down the names of the three features AND describe feature Z.**

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**[3]**

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## 11 Paloma wants to insulate her house.

She finds information about different types of insulation.

Type of insulation	Cost to fit in £	Money saved each year in £	Payback time in years
Double glazing	3000		20
Cavity wall insulation	600	100	6
Draught-proofing	25	50	0.5
Loft insulation	200	100	

(a) (i) Calculate the money saved each year for double glazing.

answer £

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

**(ii) Calculate the payback time for loft insulation.**

**answer**

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**years [1]**

**(b) Paloma has up to £600 to spend on insulation.**

**She has two options.**

**Option 1 Fit only cavity wall insulation.**

**Option 2 Fit draught proofing AND loft insulation.**

**Use the information in the table to suggest which option is best.**

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**[2]**

**(c) Cavity wall insulation is made of foam.**

**Explain why it is important that foam must contain air.**

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**[2]**

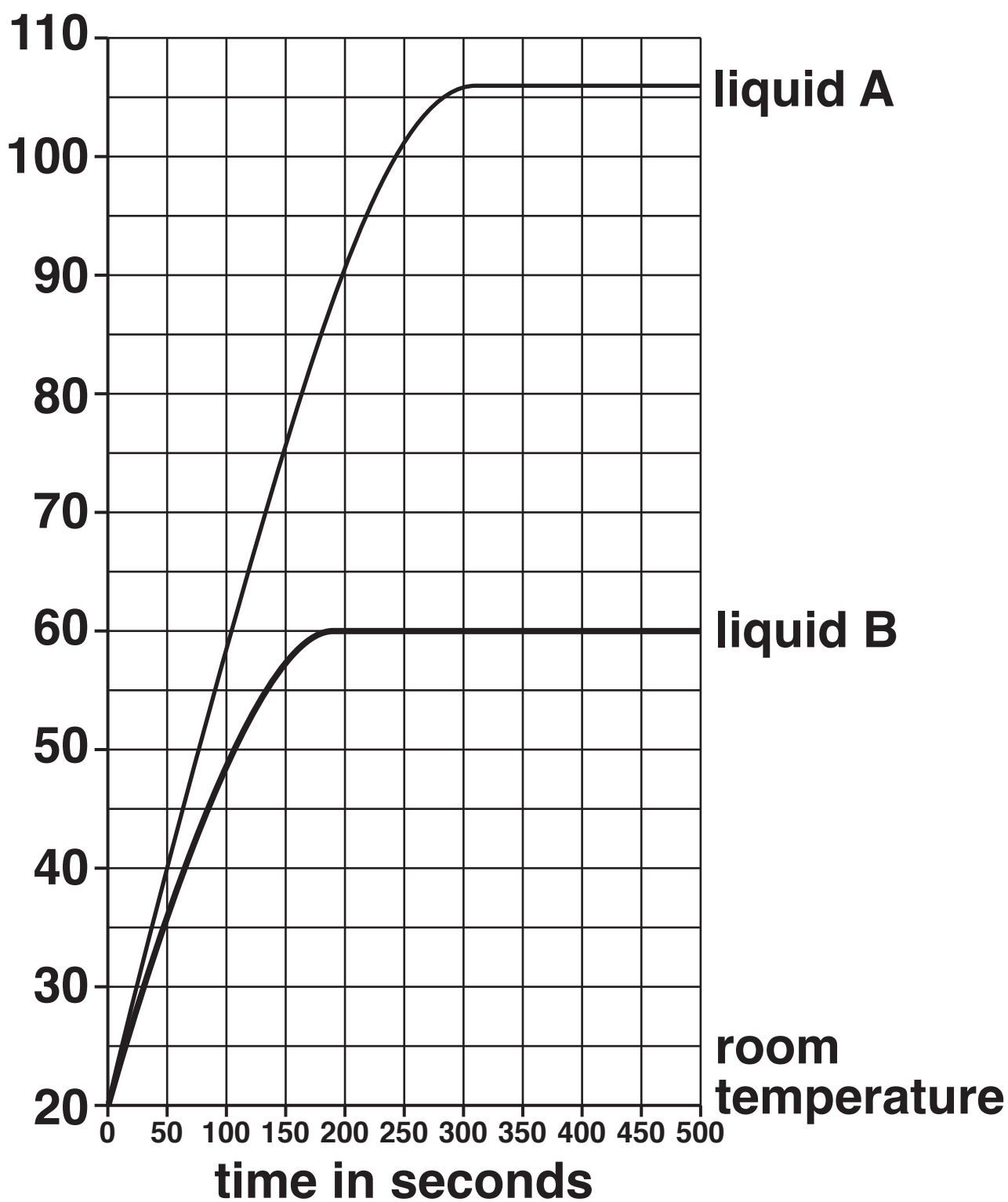
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**12 Eddie heats liquid A and records the temperature for 8 minutes every 50 seconds.**

**He then heats the same mass of liquid B and records the temperature for 8 minutes every 50 seconds.**

**Look at his results opposite.**

temperature in °C



**Eddie makes the conclusion that both liquids boiled during the experiment.**

**Describe and explain the shapes of the lines for liquid A and liquid B.**

**Use this information to write down the boiling point of liquid A and the boiling point of liquid B. [6]**



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

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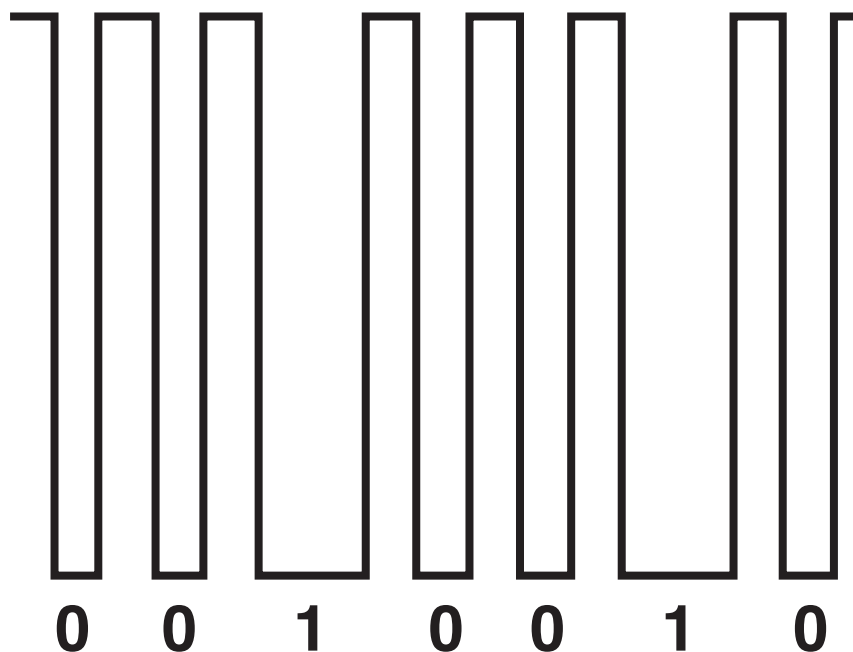
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**13 Infrared radiation is used in TV remote controls and in sensors.**

**(a) TV remote controls use flashes of infrared radiation.**

**These flashes of infrared radiation can be shown in a model.**



**(i) What type of signal is shown in the model?**

**Choose from**

**analogue**

**automatic**

**continuous**

**digital**

**answer \_\_\_\_\_ [1]**

**(ii) Use the model to describe the difference between 0 (off) and 1 (on).**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[2]**

**(b) One type of infrared sensor detects human movement.**

**This sensor does NOT detect a book falling off a desk.**

**Put a tick (✓) next to the BEST explanation about how this infrared sensor works.**

**It detects energy.**

☐

**It detects large objects.**

☐

**It detects things that are the shape of humans.**

☐

**It detects things that move long distances.**

☐

**[1]**

**END OF QUESTION PAPER**

**ADDITIONAL ANSWER SPACE**

**If additional space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).**









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