

**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GCSE**

**B722/01**

**GATEWAY SCIENCE  
ADDITIONAL SCIENCE B**

**Additional Science modules B4, C4, P4  
(Foundation Tier)**

**FRIDAY 16 JUNE 2017: MORNING**

**DURATION: 1 hour 30 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 85.**

## **EQUATIONS**

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

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

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

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

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

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

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

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

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

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

**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 B4**

**1 This question is about decay.**

**(a) Food preservation techniques  
REDUCE the rate of decay.**

**Which TWO conditions REDUCE the  
rate of decay?**

**Put ticks (✓) next to the TWO  
correct answers.**

**adding light**

☐

**adding oxygen**

☐

**adding sugar**

☐

**adding vinegar**

☐

**adding water**

☐

**[2]**

**(b) Decay is useful to farmers because they use it to break down plant waste.**

**What is formed when plant waste decays?**

**Put a ring around the correct answer. [1]**

**chlorophyll**

**compost**

**oxygen**

**sewage**

**starch**

**(c) What types of living organisms cause decay?**

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**[2]**

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**2 (a) Mites are small animals that are similar to spiders.**

**Some mites are pests that eat farmers' crop plants.**

**Some farmers use insects that are predators to kill the mites.**

**The table on the next page shows information about four species of predator insects, A, B, C and D.**

**Sue is a farmer. She grows crop plants inside a glasshouse.**

**There are mite pests living on her crop plants.**

**In her glasshouse**

**the temperature is kept between 20 and 25 °C**

**the relative humidity is kept between 50 and 60%.**

**Look at the table.**

<b>Predator species</b>	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Temperature the predators are most active at in °C</b>	<b>21 – 27</b>	<b>18 – 26</b>	<b>5 – 16</b>	<b>26 – 35</b>
<b>Relative humidity the predators are most active at %</b>	<b>&gt; 60</b>	<b>40 – 80</b>	<b>&gt; 50</b>	<b>40 – 50</b>
<b>Number of mites eaten by predators each week, in ideal conditions</b>	<b>300</b>	<b>500</b>	<b>425</b>	<b>350</b>
<b>Which part of the predator life cycle eats the mites</b>	<b>larva and adult</b>	<b>larva only</b>	<b>larva and adult</b>	<b>adult only</b>

**Which predator species will be the best one for Sue to use to kill the mites?**

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

**Explain your answer.**

**predator species** \_\_\_\_\_

**explanation** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_ **[3]**

**(b) What term describes the use of predator insects to kill mite pests?**

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

**adding pesticides**

☐

**battery farming**

☐

**biological control**

☐

**crop rotation**

☐

**hydroponics**

☐

**[1]**

**(c) Using predator insects is one example of an ORGANIC farming method.**

**Some farmers use INTENSIVE farming methods.**

**How are organic farming methods different from intensive farming methods?**

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**[2]**

**(d) The table below shows some statements about organic farming.**

**Some of these statements could be tested scientifically.**

**Some of the statements are just opinions that could NOT be tested scientifically.**

**Put ONE tick (✓) next to EACH statement to show whether it could be tested scientifically or whether it is just an opinion. [2]**

<b>Statement about organic farming</b>	<b>Could be tested scientifically</b>	<b>Just an opinion</b>
<b>Causes less water pollution than intensive farming.</b>		
<b>Is more natural than intensive farming.</b>		
<b>Produces food that is more expensive than food produced by intensive farming.</b>		
<b>Produces less food from the same amount of land as intensive farming.</b>		

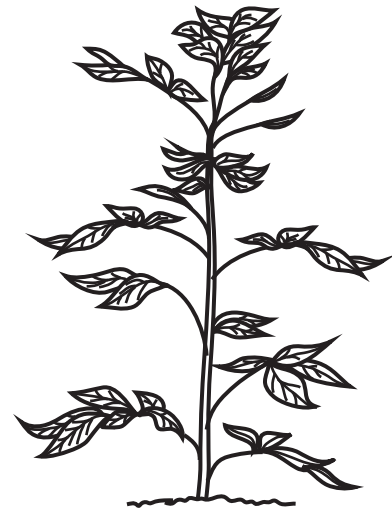
**3 Sam has a plant growing in his garden.**

**He notices that it changes its appearance after there is a lot of rain.**

**BEFORE the rain,  
the plant is  
drooping.**



**AFTER the rain,  
the plant is NOT  
drooping.**



**EXPLAIN what happened to the plant  
AFTER it rained.**

**In your answer include**

**the names of any processes involved**

**the names of any parts of the plant  
involved.**





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[6]

- 4 Liz is investigating why plants need different minerals. She puts some seedlings in different solutions to grow.**

**Test tubes 2, 3 and 4 are each missing a different mineral.**

**The distilled water in test tube 5 contains no minerals.**

**Liz makes sure that the seedlings all get the same amount of light and are kept at the same temperature.**

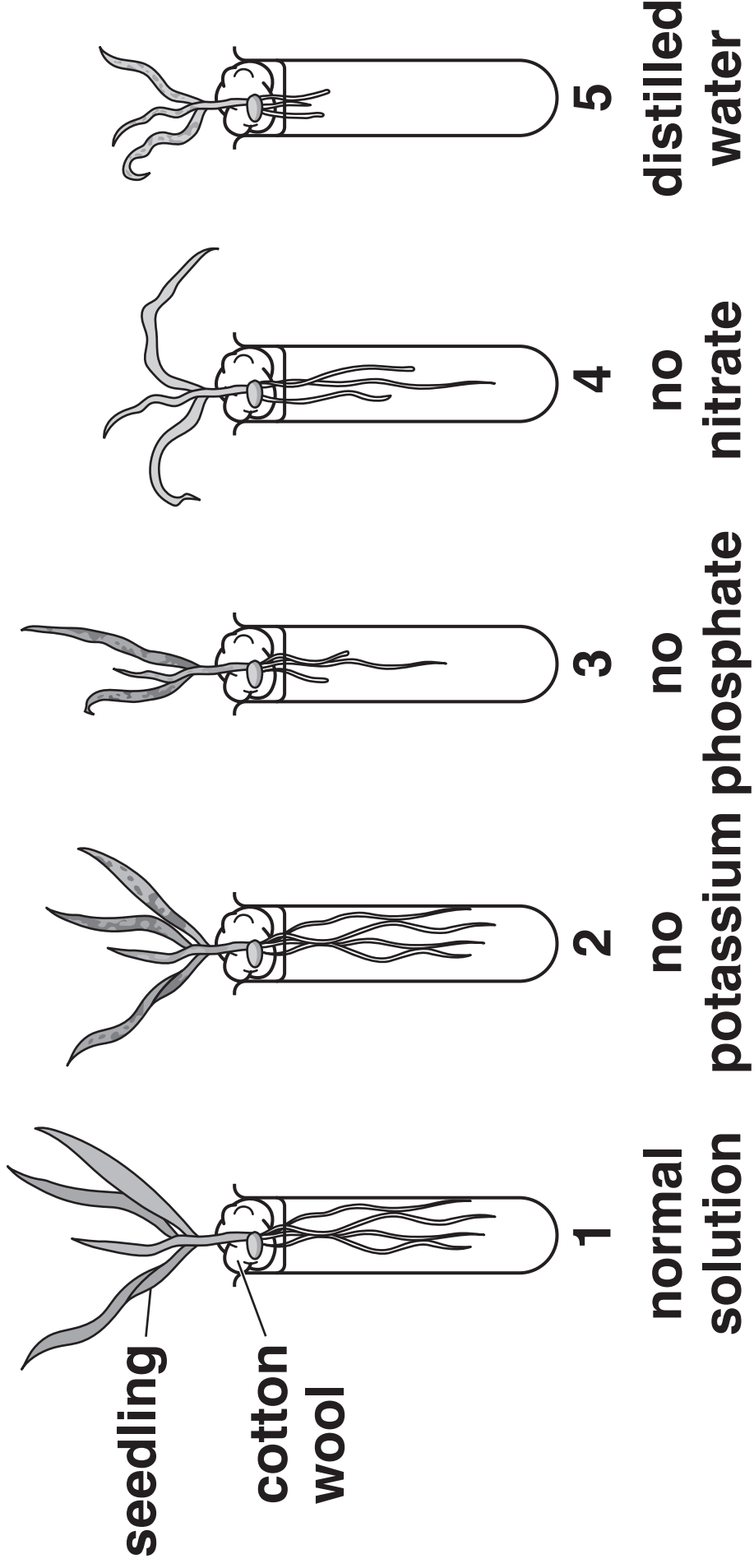
**The diagram opposite shows the seedlings after four weeks.**

- (a) What would be in the normal solution in test tube 1?**

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**[2]**



**(b) Explain the results for test tube 3.**

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[2]

**(c) In which seedling will most photosynthesis happen?**

**Explain your answer.**

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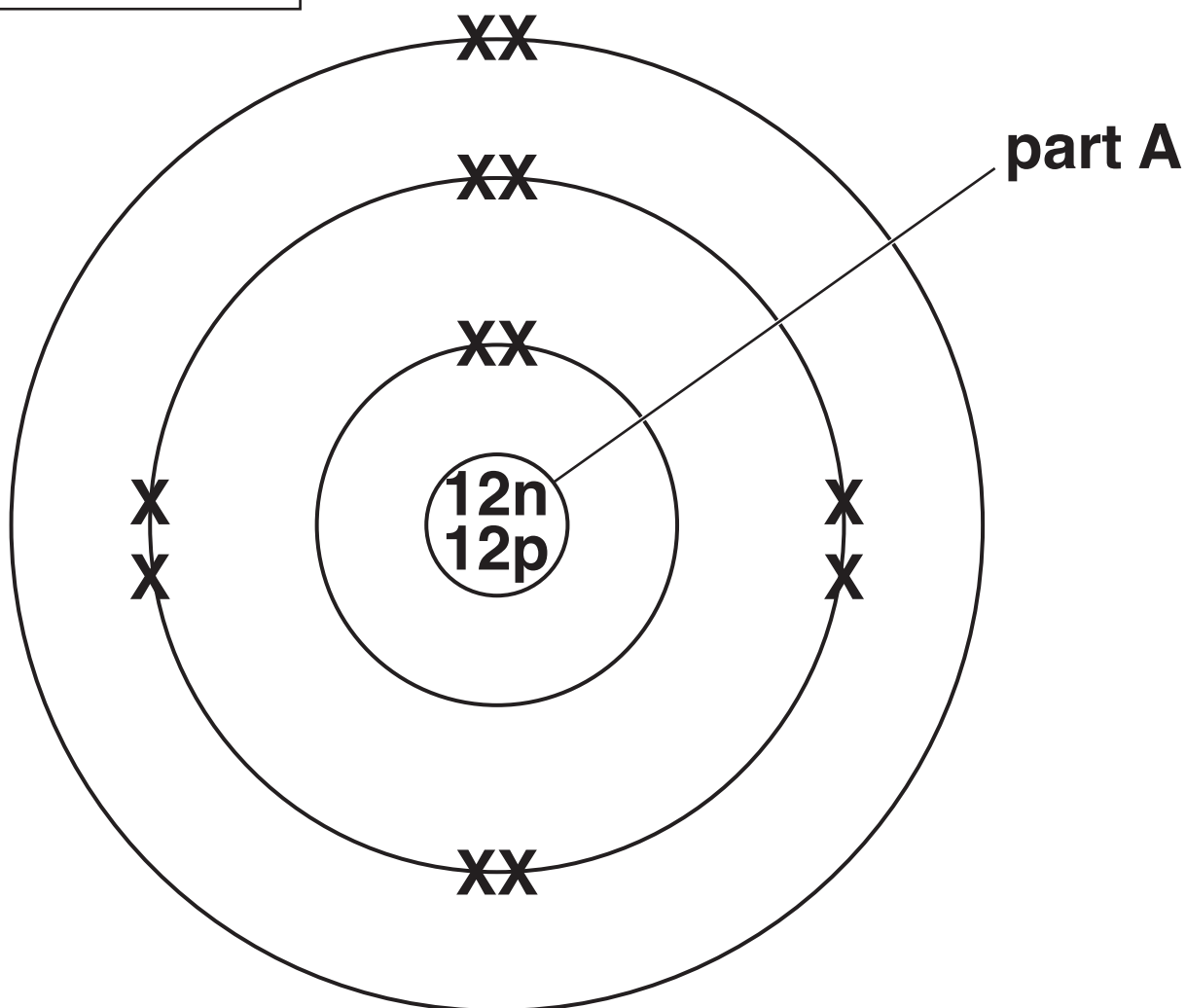
[2]

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## SECTION B – Module C4

5 Look at the diagram of the structure of an atom of an element.

n = neutrons  
p = protons



(a) What is the name of part A?

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

**(b) What is the ATOMIC NUMBER of this element?**

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

**(c) What is the MASS NUMBER of this element?**

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

**(d) How many occupied SHELLS does the atom have?**

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

**(e) The element has several ISOTOPES. This atom is one of these isotopes.**

**What is meant by the word isotopes?**

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

**6 Phil tests two unknown solutions, A and B, with**

**silver nitrate solution**

**sodium hydroxide solution.**

**Look at his table of results.**

<b>Solution</b>	<b>Effect of silver nitrate solution</b>	<b>Effect of sodium hydroxide solution</b>
<b>A</b>	<b>white solid</b>	<b>blue solid</b>
<b>B</b>	<b>stays the same</b>	<b>grey/green solid</b>

**Phil makes two conclusions.**

**Solution A contains chloride ions.**

**Solution B contains iron(III) ions.**



**Do Phil's results support each of these conclusions?**

**Explain your answer.**

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**[2]**

- 7 Peter investigates the decomposition of carbonates using the internet.**

**Look at the information that he finds.**

<b>Carbonate</b>	<b>Decomposition temperature in °C</b>
<b>calcium carbonate</b>	<b>875</b>
<b>copper carbonate</b>	<b>250</b>
<b>iron carbonate</b>	<b>375</b>
<b>magnesium carbonate</b>	<b>500</b>
<b>barium carbonate</b>	<b>1375</b>

**(a) Copper carbonate decomposes to make copper oxide and carbon dioxide.**

**(i) Write the WORD equation for this reaction.**

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

**(ii) Describe the chemical test for carbon dioxide.**

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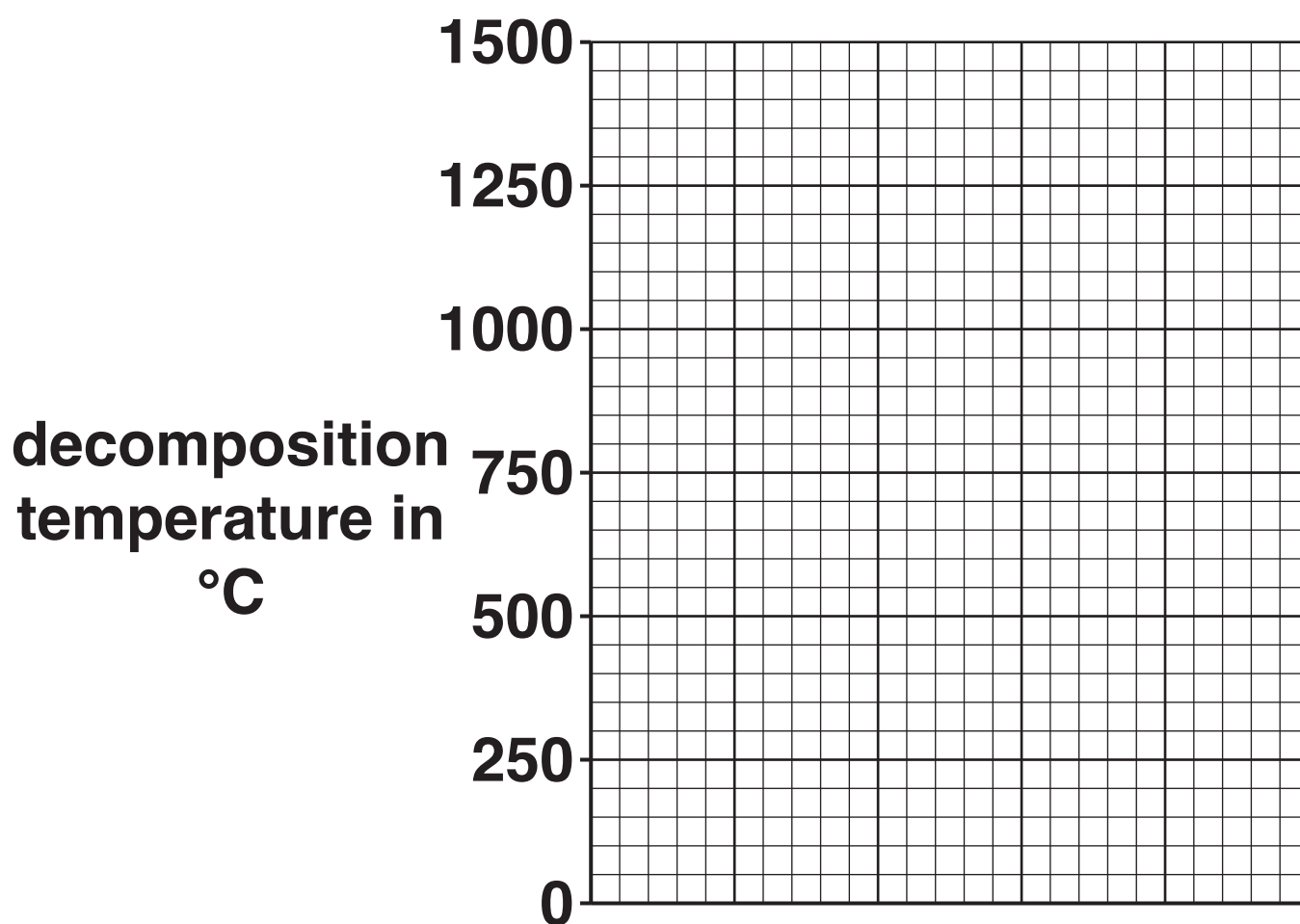
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**[2]**

**(b) Peter wants to present the data in the table in another way.**

**Present the data on the grid. [2]**



## **8 Iron and steel are typical metals.**

**Iron and steel are good conductors of heat, have a high density and are hard.**

**Iron and steel are used to make cutting tools called saws.**

**Describe FOUR OTHER physical properties of metals.**

**Explain why iron and steel are suitable to make cutting tools such as saws.**



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

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**[6]**

**9 An element has an ATOMIC NUMBER of 47.**

**(a) Use the Periodic Table to write the NAME of this element.**

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

**(b) Is this element a TRANSITION ELEMENT?**

**Explain your answer. Use information from the Periodic Table.**

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

**10 Chlorine and iodine are two elements in Group 7.**

**(a) Describe ONE use of chlorine and a DIFFERENT use of iodine.**

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**[2]**

**(b) Look at the list of formulas.**



**Which formula is a MOLECULE of a COMPOUND?**

**Choose from the list.**

**Explain your answer.**

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**[2]**



## **SECTION C – Module P4**

**11 Ultrasound is used in hospitals.**

**(a) Put rings around TWO uses for ultrasound in hospitals. [2]**

**Choose from**

**checking for broken bones**

**measuring blood flow**

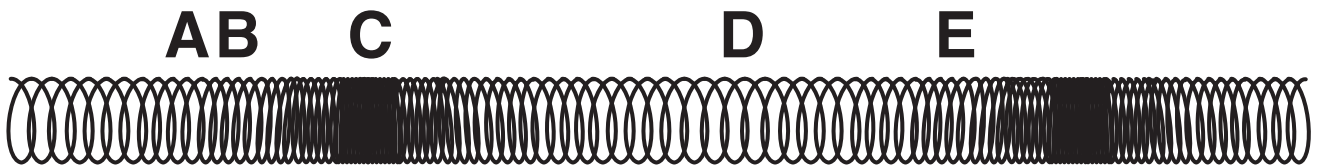
**measuring temperature**

**scanning unborn babies**

**sterilising equipment**

**(b) Ultrasound is a longitudinal wave.**

**A slinky spring can be used to model a longitudinal wave.**



**Complete the sentences about ultrasound waves.**

**Choose from    A    B    C    D    E**

**(i) A RAREFACTION is shown by**

**letter \_\_\_\_\_. [1]**

**(ii) A COMPRESSION is shown by**

**letter \_\_\_\_\_. [1]**

**(iii) The wavelength is between letter**

**\_\_\_\_\_ and letter \_\_\_\_\_. [1]**

**(c) What are the DIFFERENCES between sound waves and ultrasound waves?**

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**[2]**

**12 An engineer tests underground pipes to see if they are damaged.**

**(a) Before testing the underground pipes she measures the radioactivity from the ground.**

**Look at her results.**

<b>Day</b>	<b>Radiations in one minute</b>
<b>Monday</b>	<b>11</b>
<b>Tuesday</b>	<b>12</b>
<b>Wednesday</b>	<b>14</b>
<b>Thursday</b>	<b>10</b>
<b>Friday</b>	<b>13</b>

**(i) What is the name of this radiation AND where does it come from?**

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**[2]**

**(ii) The engineer does NOT get steady readings.**

**Suggest why.**

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**[1]**

**(iii) Use the results to calculate the MEAN number of radiations in one minute.**

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**[1]**

**(b) An underground pipe is damaged.**

**The engineer uses radioactivity to find out where the pipe is damaged.**

**She measures the radioactivity every 10m along the pipe.**

**Look at her results.**

<b>Distance along the pipe in m</b>	<b>Radiations in one minute</b>
<b>0</b>	<b>110</b>
<b>10</b>	<b>108</b>
<b>20</b>	<b>112</b>
<b>30</b>	<b>109</b>
<b>40</b>	<b>190</b>
<b>50</b>	<b>150</b>
<b>60</b>	<b>12</b>
<b>70</b>	<b>11</b>
<b>80</b>	<b>13</b>
<b>90</b>	<b>12</b>

**Describe how radioactivity is used to find the damage.**

**What does the data tell us about the damage to the underground pipe?**



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

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**[6]**

**13 Bill has electrical appliances in his home.**

**One of the appliances stops working.**

**(a) He fits a new 3 A fuse in the plug.**

**Why is a fuse used in a plug?**

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

**(b) Many appliances have three wires in the plug.**

**This appliance only needs two wires.**

**Explain why this appliance only needs two wires.**

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



**(c) The appliance uses 230 V to supply a maximum current of 3 A.**

**Calculate the maximum power of the appliance.**

**answer \_\_\_\_\_ unit \_\_\_\_\_ [2]**

**14 Nuclear power stations produce electricity.**

**Name the fuel used in a nuclear power station AND describe the stages needed to produce electricity.**

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**[3]**

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## **SECTION D**

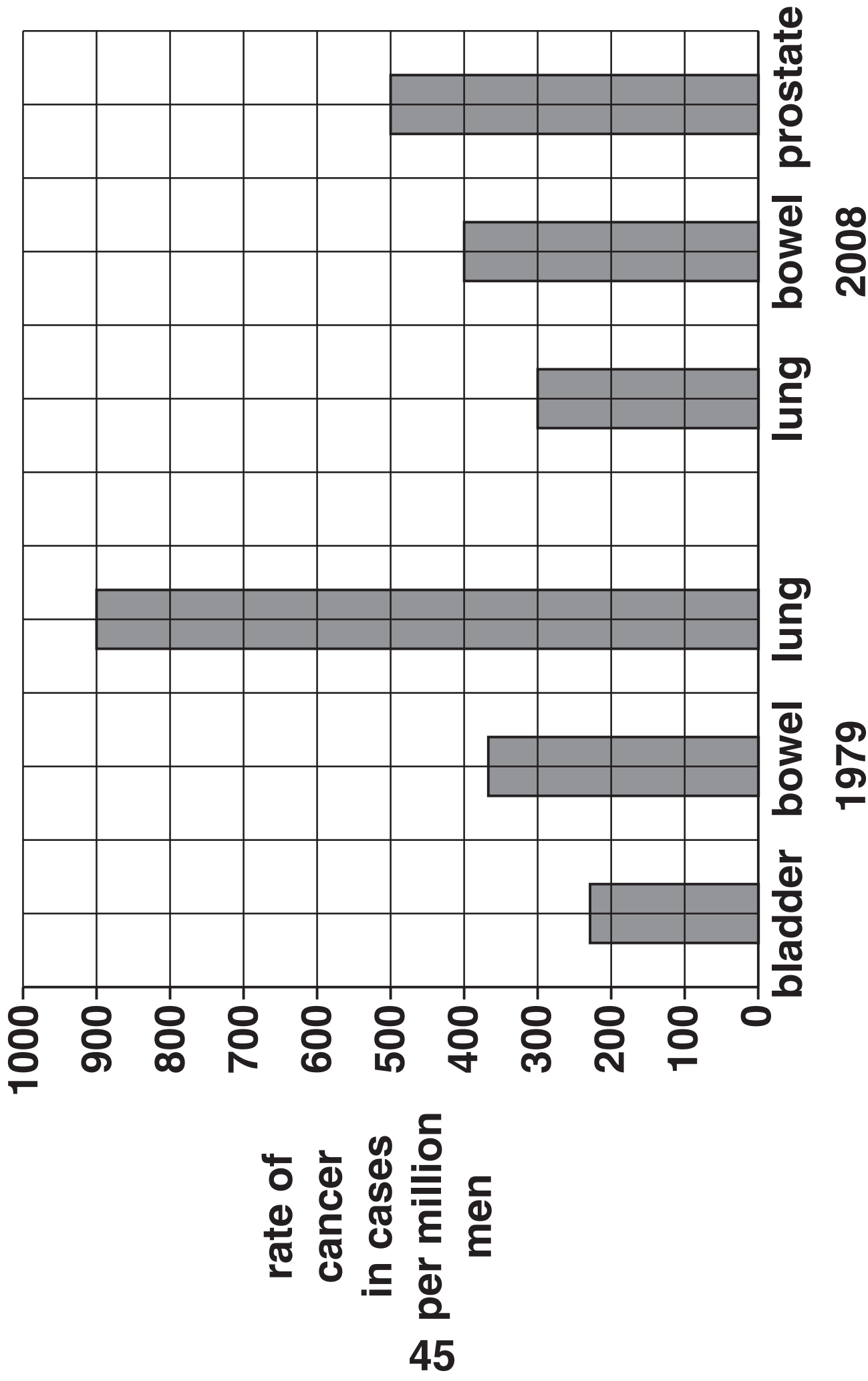
**15 Radioactive isotopes are used to treat different types of cancer.**

**(a) The graph opposite shows the rates of cancer in men aged 40–50 in Great Britain.**

**It shows the rates for the three most common types of cancer in these men in 1979 and the three most common types of cancer in these men in 2008.**

**(i) Which type of cancer has decreased the MOST in these men between 1979 and 2008?**

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



**(ii) In 2008 there were 4 million men aged between 40 and 50 in Great Britain.**

**Calculate how many of these men would be expected to have prostate cancer.**

**You should show your working.**

**answer = \_\_\_\_\_ [2]**

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**(b) Patients with cancer often have the cancer tissue (tumour) removed. They are then treated with a radioactive isotope to**

**stop the tumour growing back**

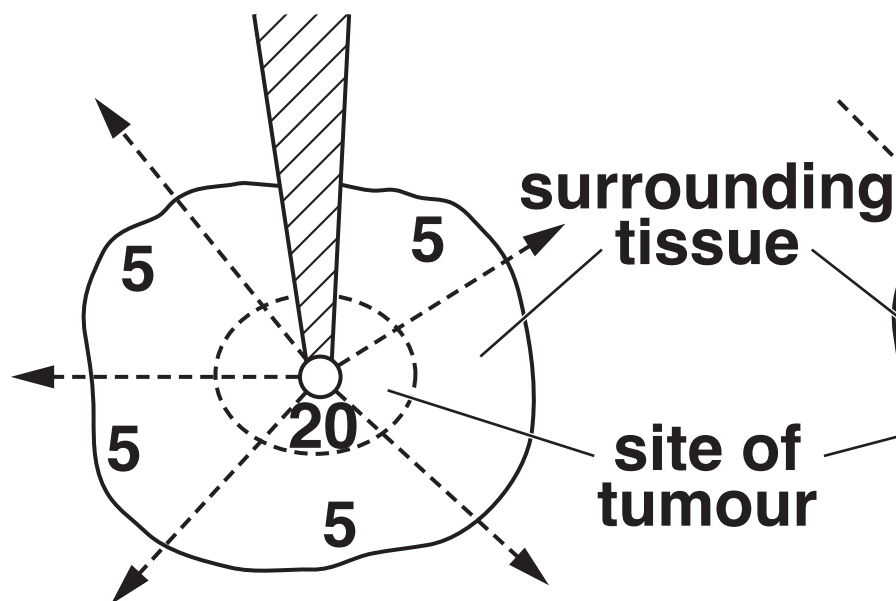
**stop any cancer cells in the surrounding tissue spreading to somewhere else in the body.**

**The diagram opposite shows two ways of using radioactive isotopes. The numbers show the amount of radiation received in different areas.**



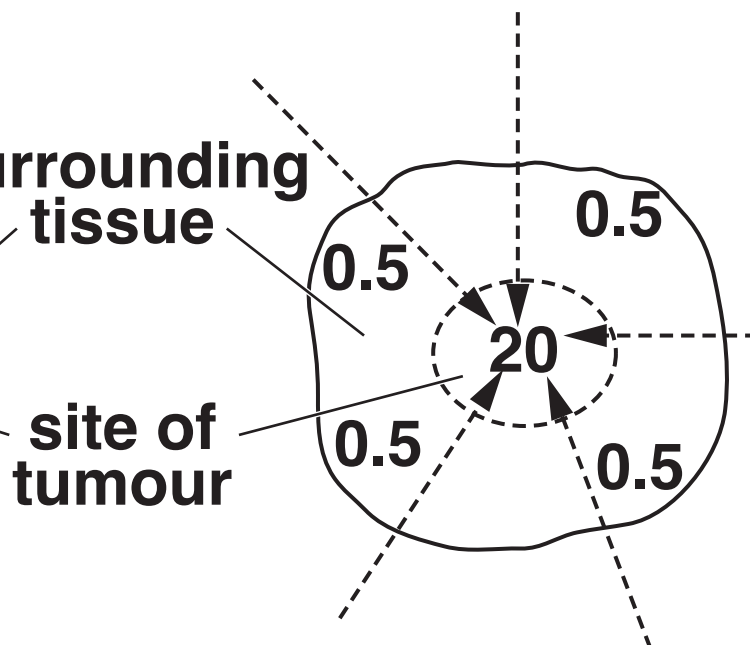
## METHOD A

The radiation is supplied by putting the isotope inside the tissue



## METHOD B

The radiation is supplied from the isotope outside the body



Compare the amount of radiation received by the cells in different parts of the tissue using method A and method B.

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[2]

**(c) Doctors designed a trial to compare these two methods of giving radiation.**

**They used 3000 patients in the trial.**

**The patients were randomly divided into two groups.**

**One group was treated with method A and the other with method B.**

**(i) Explain why a large number of patients was used in the trial.**

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[2]

**(ii) Why were the patients divided randomly into two groups?**

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[1]

**(iii) Here are some results from the trial.**

	<b>Method A</b>	<b>Method B</b>
<b>Number of patients who died from diseases such as cancers elsewhere in the body in the next five years</b>	<b>12</b>	<b>27</b>

**Compare the success of the two treatments and suggest a reason for any difference.**

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**[2]**

**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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