

Candidate forename		Candidate surname	
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Centre number						Candidate number				
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**OXFORD CAMBRIDGE AND RSA EXAMINATIONS  
GENERAL CERTIFICATE OF SECONDARY EDUCATION**

**A212/01**

**TWENTY FIRST CENTURY SCIENCE  
SCIENCE A**

**Unit 2: Modules B2 C2 P2 (Foundation Tier)**

**MONDAY 17 JANUARY 2011: Morning**

**DURATION: 40 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. Pencil may be used for graphs and diagrams only.**
- **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).**
- **Answer ALL the questions.**

## **INFORMATION FOR CANDIDATES**

- **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 42.**

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**Answer ALL the questions.**

**1 This question is about the materials we use.**

**(a) Which of these materials is a SINGLE CHEMICAL and which is a MIXTURE of chemicals?**

**For each material put a tick (✓) in the correct box.**

<b>MATERIAL</b>	<b>SINGLE CHEMICAL</b>	<b>MIXTURE</b>
<b>crude oil</b>		
<b>ethene</b>		
<b>iron</b>		
<b>wood</b>		

**[2]**

**(b) Plastic is often used instead of glass for fizzy drinks bottles.**

**The table below lists some properties of plastic bottles.**

**For each PROPERTY OF PLASTIC BOTTLES show whether it makes plastic bottles**

- BETTER THAN GLASS BOTTLES**
- WORSE THAN GLASS BOTTLES**
- NO DIFFERENT TO GLASS BOTTLES.**

**Put a tick (✓) in the correct box for each row of the table.**

<b>PROPERTY OF PLASTIC BOTTLES</b>	<b>BETTER THAN GLASS BOTTLES</b>	<b>WORSE THAN GLASS BOTTLES</b>	<b>NO DIFFERENT TO GLASS BOTTLES</b>
<b>do not break when dropped</b>			
<b>transparent</b>			
<b>less heavy</b>			

**[2]**

**(c) Plastics have replaced many materials that were used in the past.**

**Name a material, other than glass, that has been replaced by a plastic.**

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**State what the material was used for.**

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**[1]**

**Give TWO reasons why it is BETTER to use a plastic for this job.**

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**[2]**

**[Total: 7]**

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## 2 Read this newspaper article.

**Britain is getting better at collecting waste, but not at processing it.**

**8.6 million tonnes of paper are collected each year, but only 4 million tonnes are recycled in Britain.**

**The rest is exported, which increases the environmental impact of recycling. Much of it goes to China where recycling is cheaper. In China there is a big demand for recycled paper.**

**One answer is for Britain to produce less waste in the first place. Another is for Britain to develop a bigger recycling industry of its own.**

**(a) Use the article to answer these questions.**

**(i) How much paper is recycled IN BRITAIN?**

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

**All the paper collected is recycled.**

**More than half the paper collected is recycled.**

**Less than half the paper collected is recycled.**

**None of the paper collected is recycled.**

**[1]**



**(ii) Why is only 4 million tonnes of paper recycled in Britain?**

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

**We are using more paper every year.**

**Waste paper is dumped in landfill.**

**We cannot process any more waste paper.**

**Waste paper is not collected.**

**[1]**

**(iii) How can Britain reduce the environmental impact of its waste paper?**

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

**Put more waste into landfill.**

**Build more recycling plants.**

**Send more waste to other countries.**

**Recycle less waste.**

**Make less waste.**

**[2]**

**(iv) Why does sending waste paper to China increase the environmental impact of recycling?**

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

**Processing waste paper in China is cheaper than in Britain.**

**Energy is used to transport the waste to China.**

**The costs of collecting the waste are larger.**

**China puts the waste paper into landfill.**

**[1]**

**The article continues.**

**Scientists have asked the Government to stop trying to recycle so much waste.**

**They want to use the waste to make energy.**

**17 % of the energy Britain needs could come from waste by 2020.**

**This could be done by burning dry waste and by making methane from animal and plant waste.**

**(b) Explain the environmental advantage of using waste to supply 17% of Britain's energy needs.**

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**[2]**

**[Total: 7]**

### 3 Read this article about an inventor.

#### INVENTOR OF THE MICROWAVE OVEN

**In 1946, Percy Spencer was working close to radar equipment, which generates microwaves. He found that a chocolate bar in his pocket had melted. It had been heated by the microwaves.**

**From this, he developed the idea for cooking with what he called the Radarange. This type of cooker is now called a microwave oven.**

**(a) The following facts about microwaves are all true.**

**Which of them is described IN THE ARTICLE?**

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

**Microwaves can be absorbed by food.**

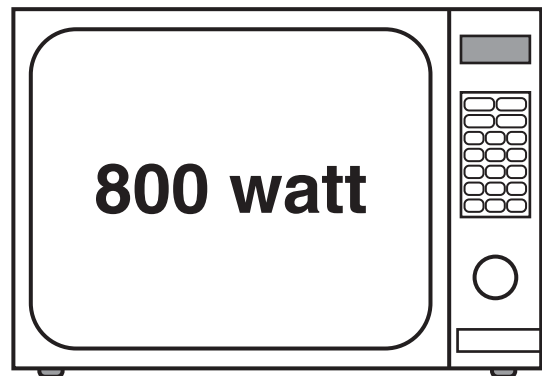
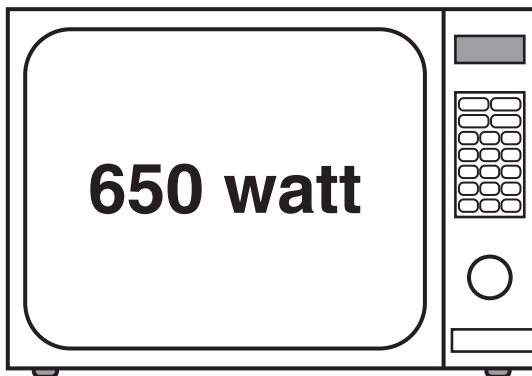
**Microwaves consist of photons.**

**Microwaves are non-ionising radiation.**

**Microwaves are part of the electromagnetic spectrum.**

**[1]**

**(b) The diagram shows two microwave ovens with different power ratings.**



**The 800 watt oven cooks food faster than the 650 watt oven.**

**The energy of the microwave photons in the two ovens is the same.**

**Which of the following statements explains why the 800 watt oven cooks faster?**

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

**The 800 watt oven has a bigger space for heating.**

**Food molecules vibrate more easily in the 650 watt oven.**

**The 800 watt oven generates more photons each second.**

**The intensity of microwaves is greater in the 650 watt oven.**

**[1]**

**(c) Some people are concerned about the safety of microwaves.**

**ANNE**

**Some microwaves may leak out of my oven. But I find it is ideal for cooking for one person, as I live alone.**

**CLIVE**

**Microwaves are not ionising, so they cannot do any harm.**

**BILAL**

**I do not like the taste of food cooked in microwave ovens. I think the microwaves damage the food.**

**DONNA**

**Mobile phones use microwaves too and I have heard they are dangerous. Perhaps they are OK if you do not use them too often.**

**(i) Which person mentions a way of reducing risk?**

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

**Anne**

**Bilal**

**Clive**

**Donna**

**[1]**

**(ii) Which person is discussing risk and benefit?  
Put a tick (✓) in the box next to the correct person.**

**Anne**

**Bilal**

**Clive**

**Donna**

**[1]**

**[Total: 4]**

**4 Before humans started burning fossil fuels, natural processes kept the concentration of carbon dioxide in the atmosphere constant.**

**Explain how PLANTS and ANIMALS, between them, kept the concentration of carbon dioxide constant.**

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**[2]**

**[Total: 2]**



**5 This question is about global warming.**

**(a) Look at graph 1 on the insert. It shows how the average temperature of the atmosphere has changed over the last 250 000 years.**

**Use the graph to answer these questions.**

**(i) What was the average temperature 100 000 years ago?**

**answer = \_\_\_\_\_ °C [1]**

**(ii) What is the highest temperature recorded on the graph?**

**answer = \_\_\_\_\_ °C [1]**

**(b) Compare graph 1 with graph 2 on the insert.**

**Use data from the two graphs to explain the meaning of CORRELATION.**

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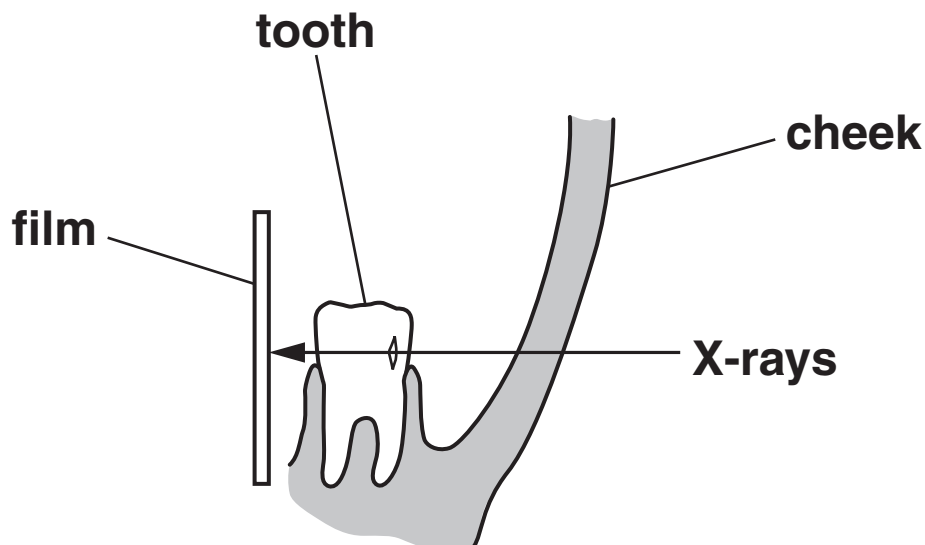
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**[2]**

**[Total: 4]**

**6 Dentists use X-rays to look for cracks and holes inside a patient's teeth.**

**The X-ray tube is held next to the patient's cheek and an X-ray film is put inside the mouth.**



**sectional view through patient's jaw**

- (a) Label the region of X-rays on the diagram opposite of the electromagnetic spectrum. [1]**
- (b) Which of these statements explains how the X-rays get through the patient's cheek?**

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

**X-rays are absorbed by the patient's cheek.**

**X-rays are emitted by the patient's cheek.**

**X-rays are reflected by the patient's cheek.**

**X-rays are transmitted by the patient's cheek.**

**[1]**

<b>RADIO WAVES</b>		<b>INFRARED</b>	<b>LIGHT</b>		<b>GAMMA RAYS</b>
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**(c) X-rays can damage living cells.**

**Which of the following statements explains why dentists use X-rays?**

**Put a tick (✓) in the box next to the BEST statement.**

**X-rays stop the teeth from rotting.**

**The patient wears protective clothing.**

**Dentists use harmless X-rays.**

**The benefit from using X-rays outweighs the risk.**

**[1]**

**(d) There is a risk to the dentist because she uses X-rays every day.**

**When the X-ray tube is switched on, the dentist moves as far away from the tube as she can.**

**Which of the following explains why she does this?**

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

**You cannot see X-rays.**

**X-rays are absorbed by bones.**

**X-rays are weaker farther away from the tube.**

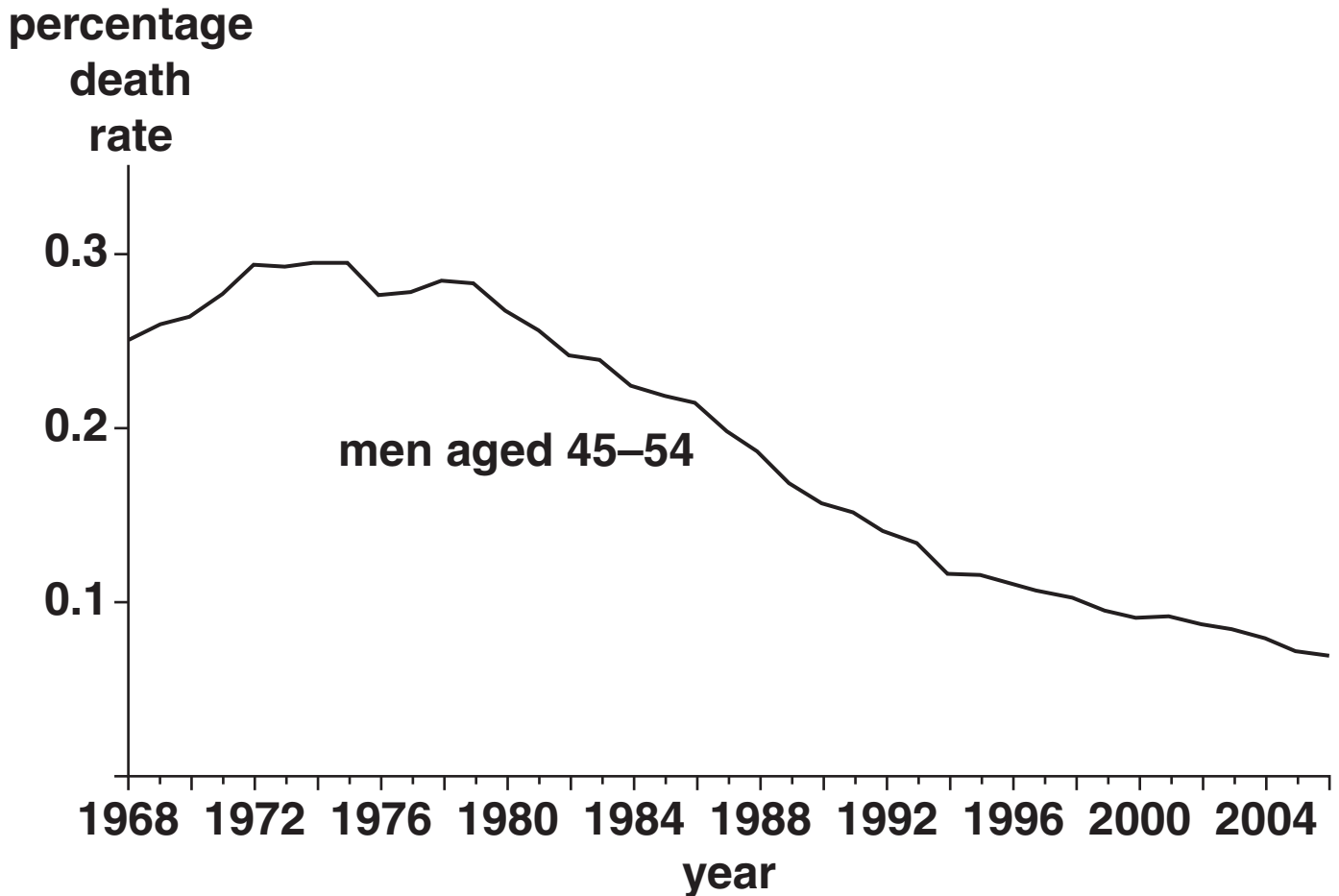
**X-rays are an electromagnetic radiation.**

**[1]**

**[Total: 4]**

**7 Look at the graph.**

**The graph shows the percentage death rate in the UK due to coronary heart disease for men aged 45 to 54 between 1968 and 2006.**



- (a) (i) Complete each sentence by putting a ring around the CORRECT alternative.**

**From 1968 the death rate increased until 1972 / 1985 / 1995.**

**In 2006 the death rate was THE SAME AS / LOWER THAN / HIGHER THAN in 1968. [1]**

**(ii) Suggest TWO changes in men's lifestyles that may have resulted in the change from 1968 to 2006.**

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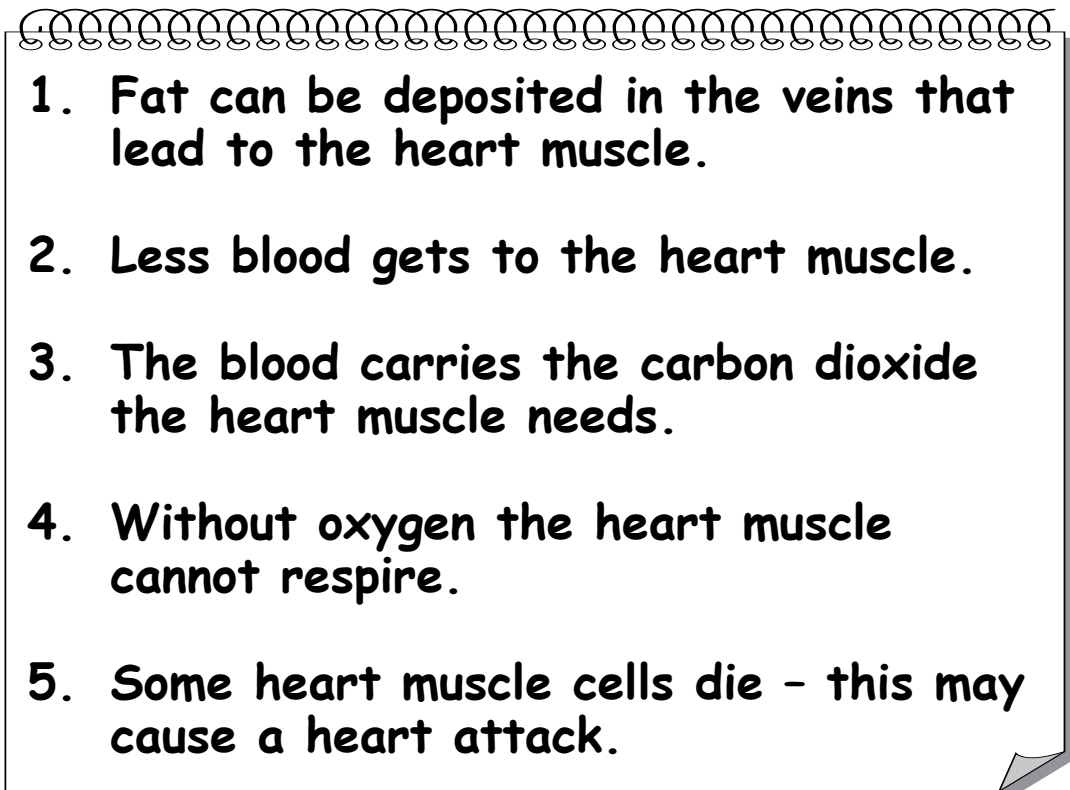
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**[2]**

**(b) Pauline makes notes on the causes of heart disease.**

**Here is what she has written.**

**She has made some mistakes.**

- 
- 1. Fat can be deposited in the veins that lead to the heart muscle.**
  - 2. Less blood gets to the heart muscle.**
  - 3. The blood carries the carbon dioxide the heart muscle needs.**
  - 4. Without oxygen the heart muscle cannot respire.**
  - 5. Some heart muscle cells die - this may cause a heart attack.**

**Write down the numbers of the two sentences that contain mistakes.**

**sentences \_\_\_\_\_ and \_\_\_\_\_ **[2]****

**[Total: 5]**

**8 This question is about the development of new vaccines and drugs.**

**(a) In 1976 in the USA there was an outbreak of flu caused by a new type of H1N1 virus.**

**The US Government decided to make a new vaccine against H1N1 to prevent an epidemic.**

**(i) How do vaccines work?**

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

**Vaccines kill microorganisms.**

**Vaccines stop microorganisms entering the body.**

**Vaccines stop microorganisms reproducing.**

**Vaccines trigger the production of antibodies.**

**[1]**

**(ii) Why did the US Government NOT suggest using antibiotics?**

**Put a tick (✓) in the box next to the BEST reason.**

**Antibiotics do not kill viruses.**

**It takes longer to produce antibiotics than vaccines.**

**It is cheaper to produce a new vaccine.**

**Viruses become resistant to antibiotics.**

**[1]**



**(iii) The US Government started to vaccinate the whole population against the new virus.**

**To prevent a flu epidemic, this would have cost \$137 million.**

**Side effects from the vaccine occurred in about 500 people.**

**Side effects occurred in less than 1 in 100 000 of those vaccinated.**

**Most of the people with side effects recovered but some died.**

**The Government decided to stop the vaccination programme early.**

**Less than a quarter of the population had been vaccinated.**

**Write down ONE reason for stopping the vaccination programme and ONE reason against stopping the vaccination programme.**

**for stopping \_\_\_\_\_**

\_\_\_\_\_

**against stopping \_\_\_\_\_**

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

- (b) (i) New drugs are tested to see how **EFFECTIVE** and how **SAFE** they are.

Testing takes place in several stages.

For each **STAGE OF DRUG TESTING** put **ONE** tick (✓) in the correct box to show whether the stage is testing **EFFECTIVENESS**, testing **SAFETY** or testing **BOTH**.

<b>STAGE OF DRUG TESTING</b>	<b>TEST USED TO CHECK</b>		
	<b>EFFECTIVENESS</b>	<b>SAFETY</b>	<b>BOTH</b>
human cells grown in the laboratory			
animals			
healthy volunteers			
people with the illness			

[2]

- (ii) A new scientific claim is more reliable if it has been PEER REVIEWED.**

**Put a tick (✓) in the box that best describes peer review.**

**The new claim has been checked by other scientists.**

**The original scientist repeats the experiments.**

**The original scientist checks for errors in the methods.**

**The new claim has appeared in the newspapers.**

**[1]**

**(c) Over a period of time bacteria become resistant to antibiotics.**

**Therefore new antibiotics need to be developed.**

**We can slow the spread of antibiotic resistance in bacterial populations by using antibiotics carefully.**

**Draw a straight line to link each WAY OF SLOWING THE SPREAD OF RESISTANCE with its best EXPLANATION.**

**WAY OF SLOWING THE SPREAD OF RESISTANCE**

**EXPLANATION**

**only use antibiotics when you are infected by a dangerous type of bacteria**

**it is important to kill all the infecting bacteria**

**it is the resistant bacteria that we most need to kill**

**once you are feeling well all the bacteria will have been killed**

**always finish a course of antibiotics even if you feel better**

**it is important to quickly treat all bacterial infections**

**the more often antibiotics are used the more likely resistance is to spread**

**[2]**

**[Total: 9]**

**END OF QUESTION PAPER**

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