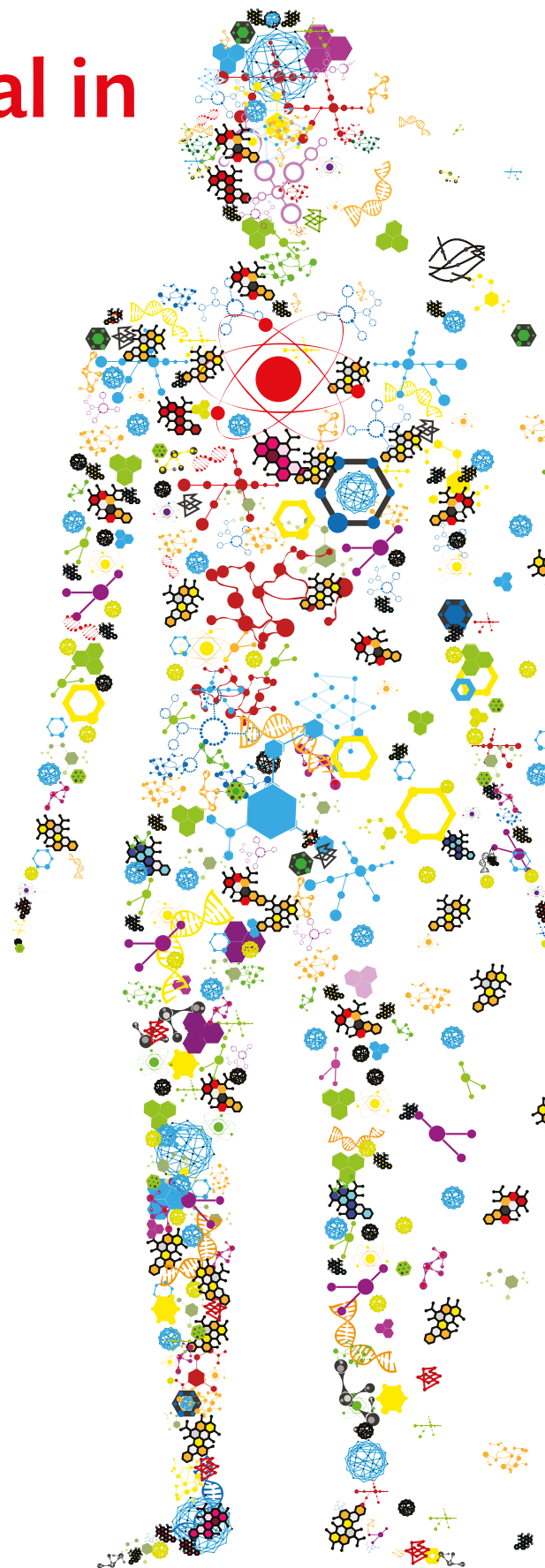


Pearson BTEC Level 3 National in Applied Human Biology

Unit 3: Human Biology and
Health Issues

Sample Assessment Materials (SAMs)



For use with Extended Certificate in Applied Human Biology

First teaching from September 2018

Issue 1

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Please check the examination details below before entering your candidate information

Candidate surname					Other names					
Pearson BTEC Level 3 Nationals Extended Certificate	Centre Number					Learner Registration Number				
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Sample assessment material for first teaching September 2018										
Supervised hours: 3 hours					Paper Reference xxxxxx/xx					
Applied Human Biology										
Unit 3: Human Biology and Health Issues										
You do not need any other materials.										Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and learner registration number.
- Answer **all** activities.
- Answer the activities in the spaces provided – *there may be more space than you need.*
- This booklet contains material for the completion of the set task under supervised conditions.
- This booklet is specific to each series and this material must be issued only to learners who have been entered to undertake the set task.
- This booklet should be kept securely until the start of the 3-hour supervised assessment period. This set task should be undertaken in a session timetabled by Pearson.

Information

- The total mark for this paper is 60.
- The marks for **each** activity are shown in brackets – *use this as a guide as to how much time to spend on each activity.*

Advice

- Read each activity carefully before you start to answer it.
- Try to answer every activity.
- Check your answers if you have time at the end.

Turn over ►

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Pearson

Instructions for teachers/tutors and/or invigilators

Centres must issue this booklet at the appropriate time and advise learners of the timetabled session.

All learner work must be completed independently and authenticated before being submitted to Pearson by the teacher/tutor or invigilator.

Learners are advised to spend 30–45-minutes reading through the stimulus material in the set task and annotate the material if they wish to do so.

Learners are required to use the stimulus material to complete the activities. Learners must complete the set task using this task booklet.

Teachers/tutors and/or invigilators should note that:

- learners should not be given any direct guidance or prepared materials
- all work must be completed independently by the learner
- learners must not bring anything into the supervised environment or take anything out without your approval.

Centres are responsible for putting in place appropriate checks to ensure that only permitted material is introduced into the supervised environment.

Maintaining security:

- During supervised assessment sessions, the assessment areas must only be accessible to the individual learner and to named members of staff.
- Learners can only access their work under supervision.
- Any work that learners produce under supervision must be kept securely.
- Only permitted materials for the set task can be brought into the supervised environment.
- During any permitted break and at the end of the session materials must be kept securely and no items removed from the supervised environment.
- Learners are not permitted to have access to the internet or other resources during the supervised assessment period.

After the session, the teacher/tutor or invigilator will confirm that all learner work has been completed independently as part of the authentication submitted to Pearson.

The set task is a formal external assessment and must be conducted with reference to the instructions in this task booklet and to the *Instructions for Conducting External Assessments (ICEA)* document; this is to ensure that the preparatory period is conducted correctly so that learners complete their preparation validly and independently.

Outcomes for submission

This task booklet should be submitted to Pearson.

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Instructions for learners

Read the set task information carefully.

You are advised to spend 30–45 minutes reading carefully through all the stimulus material in the set task.

You may annotate the stimulus material before you attempt the activities.

Complete all your work in this booklet in the spaces provided.

This session is three hours. Your teacher/tutor or invigilator will tell you if there is a supervised break. Plan your time carefully.

In your response to the activities, you should consider information from the article and draw on your knowledge and understanding of applied human biology principles, procedures and techniques to support your answers.

You will complete this set task under supervision and your work will be kept securely during any breaks taken.

You must work independently throughout the supervised assessment period and you should not share your work with other learners.

Your teacher/tutor or invigilator may clarify the wording that appears in this task but they cannot provide any guidance on completion of the task.

Outcome for submission

This completed booklet.

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Set task information

You are given the following article:

Infections will kill millions – ACT NOW to save our antibiotics

You need to become familiar with the article and gain an understanding of the health issue involved so that you are able to interpret, analyse and evaluate the article.

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Infections will kill millions – ACT NOW to save our antibiotics

Doctors are warned by health researchers 'stop prescribing antibiotics to patients unnecessarily, or face a healthcare crisis'.

The prescribing of antibiotics to patients, often unnecessarily, is contributing to a crisis in which more and more antibiotic-resistant infections are developing year by year. The NHS website lists several strains of bacteria that have now become 'superbugs', which are bacterial infections that are challenging to treat because of their resistance to antibiotics.

These bacterial strains include methicillin-resistant *Staphylococcus aureus* (MRSA), *Clostridium difficile* (*C. diff*), multi-resistant tuberculosis (MDR-TB) and carbapenemase-producing *Enterobacteriaceae* (CPE).

Worldwide, these types of infections are fast becoming an increasing cause of death and disability, including limb amputations and long-term respiratory difficulty.

Inappropriate prescribing is stated, by the World Health Organization (WHO), as one of the main causes of antibiotic resistance, and as a result Public Health England (PHE) has launched campaigns to help address these issues.

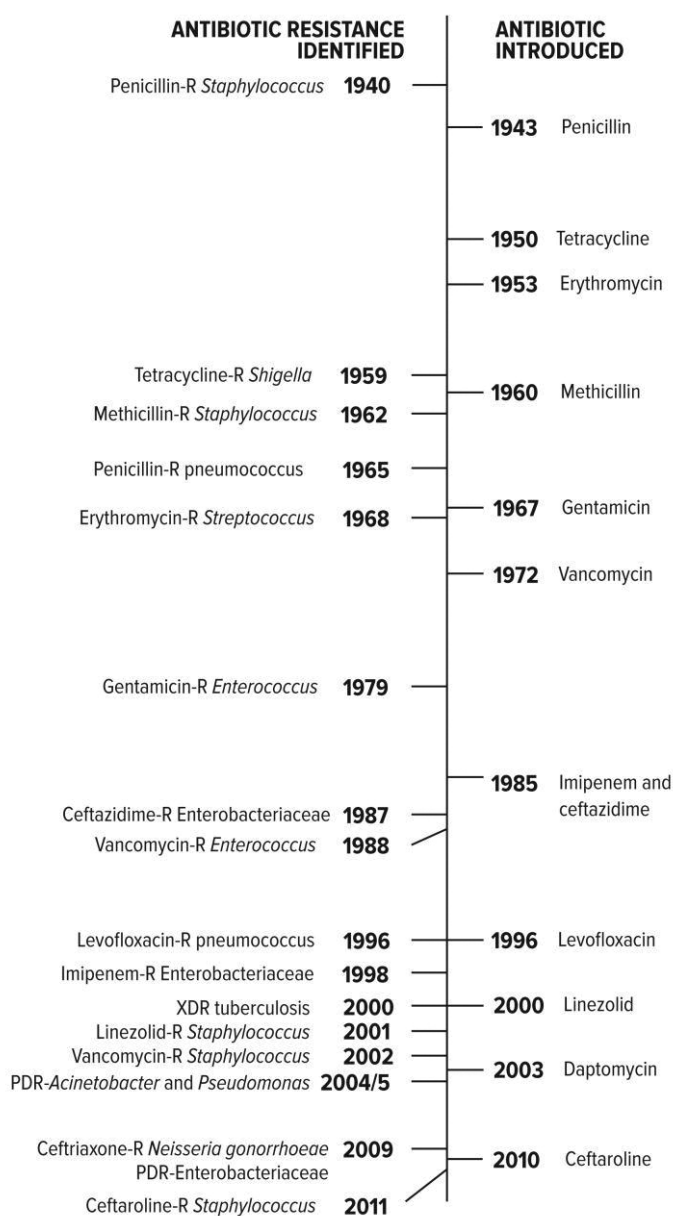
History

From the late 1960s through the early 1980s, the pharmaceutical industry introduced many new antibiotics to solve the resistance issue, but after that fewer new drugs were introduced, despite an increase in resistant antibiotics.

Why should you be worried about antibiotic resistance?

Antibiotics are used to treat bacterial infections, many of which would get better on their own. They do not work on illnesses such as colds, flu and coughs and sore throats caused by viral infections. Antibiotics are needed, however, to protect vulnerable members of our society from bacterial infections that they may be more susceptible to compared to a healthy person. Children, the elderly and those with underlying medical conditions such as asthma, diabetes and cancer may need extra help fighting off bacterial infections. People with a weaker immune system are at greater risk of serious infections, which can become life threatening.

Figure 1 Developing Antibiotic Resistance: A Timeline of Key Events⁵



PDR = pan-drug-resistant; R = resistant; XDR = extensively drug-resistant

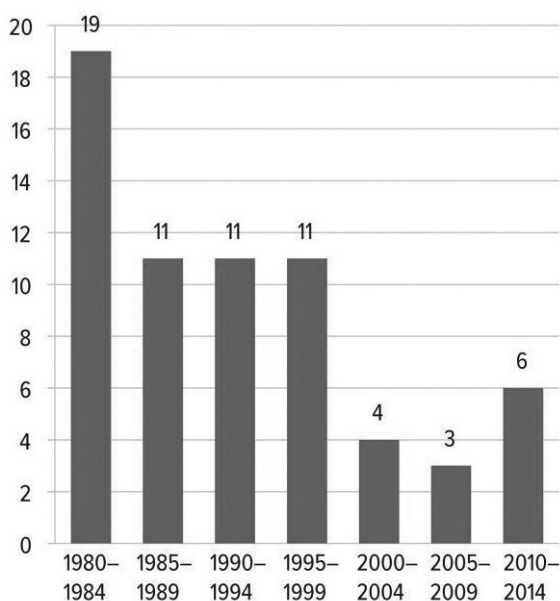
Dates are based upon early reports of resistance in the literature. In the case of pan-drug-resistant *Acinetobacter* and *Pseudomonas*, the date is based upon reports of health care transmission or outbreaks. Note: penicillin was in limited use prior to widespread population usage in 1943.

Increased antibiotic resistance in bacterial populations means that our first line of defence against infections will not work in the future, potentially putting people's lives at risk. Antibiotic-resistant infections also burden families and communities due to lost wages and health care costs.¹

Inappropriate prescribing and failures to complete the prescribed course can contribute to genetic alterations in bacterial populations, including antibiotic-induced gene expression and mutations. Genetic alterations can cause the bacteria to become resistant to the antibiotics, making the antibiotics ineffective forms of treatment. The resistant bacteria survive to reproduce and can then spread to other people within the community. A reservoir of antibiotic-resistant bacteria has then been created.

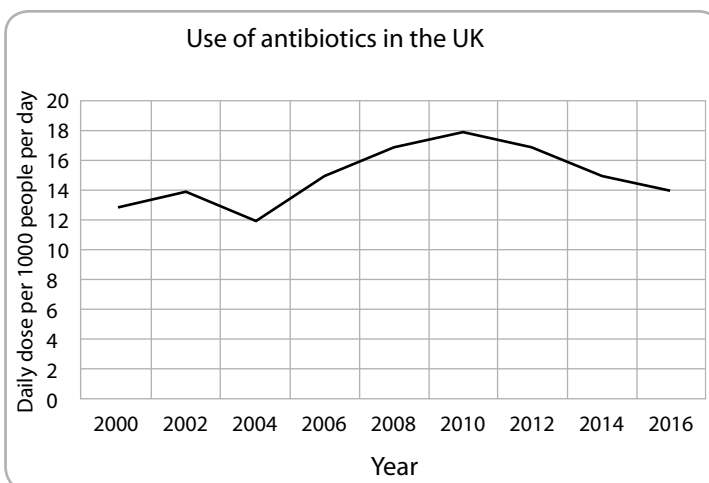
The number of antibiotics being prescribed each year in the UK had been steadily increasing, however numbers have fallen slightly in the past six years. Despite improvements, it is estimated that antibiotics are inappropriately prescribed in around 50% of cases. However, the development of new antibiotics by the pharmaceutical industry, a strategy that had been effective at combating resistant bacteria in the past, had essentially stalled due to economic and regulatory obstacles (Figure 3).² Of the 18 largest pharmaceutical companies, 15 abandoned the antibiotic field.²

Figure 3 Number of Antibacterial New Drug Application Approvals Versus Year Intervals



The number of new antibiotics developed and approved has decreased steadily over the past three decades (although four new drugs were approved in 2014), leaving fewer options to treat resistant bacteria.

* Drugs are limited to systemic agents. Data courtesy of the CDC⁵ and the FDA Center for Drug Evaluation and Research.



Antibiotic development is no longer considered to be an economically-wise investment for the pharmaceutical industry.¹ Because antibiotics are used for relatively short periods, they are not as profitable as drugs that treat chronic conditions, such as diabetes, psychiatric disorders or asthma. Medicines for chronic conditions are more profitable, therefore pharmaceutical companies prefer to invest in them.

Another factor is the relatively low cost of antibiotics. The average cost of treating an infection with a 5 day course of Amoxicillin is 56p, whereas the minimum cost for a prostate cancer treatment is £747. The availability, ease of use, and generally low cost of antibiotics has also led to them being perceived by purchasers and the public as being of low value.

When new antibiotics are eventually developed, the emergence of resistance almost always occurs. However, the time taken for the development of resistance is unpredictable. A manufacturer that invests large sums of money into antibiotic development may find that its profits are suddenly reduced when resistance develops to its new antibiotic.¹ Also, most antibiotics are supplied by manufacturers of generic drugs. This means that the antibiotics are generally cheap and effective which is good for the public; however, it is often expected that all antibiotics should be priced the same, even ones that target multidrug-resistant (MDR) pathogens.

Because of these factors, many large pharmaceutical companies are not keen to invest in the development of new antibiotics.

What is being done to reduce antibiotic resistance?

In 2013 Public Health England (PHE) launched a 5-year Antimicrobial Resistance Strategy. As part of this, the 'Keep Antibiotics Working' campaign aims to reduce the inappropriate prescribing and use of antibiotics through public education. The campaign also provides healthcare professionals with resources they can download and use.

For example, North Hampshire Clinical Commissioning Group, in a bid to promote the safe, effective and economic use of antibiotics, has developed an app for doctors and healthcare professionals. The app provides a simple and practical approach to prescribing antibiotics. Health and social care workers, members of the public and educators can also pledge to be 'Antibiotic Guardians'. This encourages people to take responsibility for their own antibiotic use and share information on the issue with family and friends. These schemes, along with a series of television adverts, aim to tackle the growing problem of antibiotic resistance. But is it enough?

Antibiotic use in agriculture has been prohibited in Europe since 2006, but some MPs are now calling for stricter regulations on the prescribing of antibiotics in GP surgeries so that antibiotics keep working for the future.

Antibiotics have been used in medicine since 1945 saving the lives of millions and we have a duty to protect their use for our future generations.

1. Michael CA, Dominey-Howes D, Labbate M. The antibiotic resistance crisis: causes, consequences, and management. *Frontiers Public Health*. 2014;2:145.
2. Bartlett JG, Gilbert DN, Spellberg B. Seven ways to preserve the miracle of antibiotics. *Clinical Infectious Disease*(official publication of the Infectious Diseases Society of America). 2013;56(10):1445–1450.

Figure 1 and Figure 3 first published in: National Center for Biotechnology Information <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4378521/> Ventola, L., 2015 The Antibiotic Resistance Crisis *Pharmacy & Therapeutics* 40 (4), 277-283.

Set task

Answer all activities in the spaces provided.

The activities in this task are based on the article.

You will be expected to use the article and draw on your knowledge and understanding of applied human biology principles, procedures and techniques to support your answers.

- 1** Discuss how the article uses scientific information to present the antibiotic resistance crisis.

In your answer, you should consider:

- how the article has interpreted and analysed scientific information to support the conclusions/judgements being made
- validity and reliability.

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(Total for Activity 1 = 12 marks)

2 Discuss the key factors affecting the antibiotic resistance crisis.

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(Total for Activity 2 = 16 marks)

3 Explain how different organisations/individuals influence the antibiotic resistance crisis.

In your answer you should consider:

- research
- health initiatives.

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(Total for Activity 3 = 10 marks)

4 Suggest potential areas for further development and/or research of the antibiotic resistance crisis.

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(Total for Activity 4 = 6 marks)

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(Total for Activity 5 = 16 marks)

TOTAL FOR PAPER = 60 MARKS

Unit 3: Human Biology and Health Issues – sample marking grid

General marking guidance

- All learners must receive the same treatment. Examiners must mark the first learner in exactly the same way as they mark the last.
- Marking grids should be applied positively. Learners must be rewarded for what they have shown they can do rather than be penalised for omissions.
- Examiners should mark according to the marking grid, not according to their perception of where the grade boundaries may lie.
- All marks on the marking grid should be used appropriately.
- All the marks on the marking grid are designed to be awarded. Examiners should always award full marks if deserved. Examiners should also be prepared to award zero marks if a learner's response is not rewardable, according to the marking grid.
- Where judgement is required, a marking grid will provide the principles by which marks will be awarded.
- When examiners are in doubt regarding the application of the marking grid to a learner's response, a senior examiner should be consulted.

Specific marking guidance

- The marking grids have been designed to assess learner work holistically.
- Rows within the grids identify the assessment focus/outcome being targeted. When using a marking grid, the 'best fit' approach should be used.
- Examiners should first make a holistic judgement on which band most closely matches the learner response and place it within that band. Learners will be placed in the band that best describes their answer.
- The mark awarded within the band will be decided based on the quality of the answer in response to the assessment focus/outcome and will be modified according to how securely all bullet points are displayed at that band.
- Marks will be awarded towards the top or bottom of that band depending on how they have evidenced each of the descriptor bullet points.

Activity 1: Discuss how the article uses scientific information to present the antibiotic resistance crisis. (12 marks)

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
Inter-pretation, analysis and evaluation of scientific information.	<p>0</p> <p>Level of response not worthy of credit.</p>	<p>1-3</p> <p>Generalised comments about how the health issue is presented, with limited attempt to consider any of the following:</p> <ul style="list-style-type: none"> how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made the validity and reliability of data. 	<p>4-6</p> <p>The presentation of the health issue is discussed, partially supported by a consideration of some of the following:</p> <ul style="list-style-type: none"> how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made the validity and reliability of data. 	<p>7-9</p> <p>The presentation of the health issue is discussed, mostly supported by a consideration of:</p> <ul style="list-style-type: none"> how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made the validity and reliability of data. 	<p>10-12</p> <p>The presentation of the health issue is discussed, consistently supported throughout by the consideration of:</p> <ul style="list-style-type: none"> how the article has interpreted and analysed the scientific information to support the conclusions/ judgements being made the validity and reliability of data.

Activity 2: Discuss the key factors affecting the antibiotic resistance crisis. (16 marks)

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
Understanding the key factors that affect the health issue	<p>0</p> <p>Level of response not worthy of credit.</p>	<p>1-4</p> <p>Demonstrates limited knowledge and understanding of the key factors affecting the health issue with generalised comments made.</p> <p>Limited or no reference made to the article.</p>	<p>5-8</p> <p>Demonstrates adequate knowledge and understanding of the key factors affecting the health issue.</p> <p>Attempts to use the article through the selection of some relevant aspects to support answer.</p>	<p>9-12</p> <p>Demonstrates good knowledge and understanding of the key factors affecting the health issue.</p> <p>Sustained and logical connections made to the article through the selection of relevant aspects to support answer.</p>	<p>13-16</p> <p>Demonstrates comprehensive knowledge and understanding of the key factors affecting the health issue.</p> <p>Sustained and comprehensive links made to the article through the selection of a wide range of relevant aspects to support answer.</p> <p>Displays a well-developed and logical discussion that clearly considers a wide range of different aspects.</p>

Activity 3: Explain how different organisations/ individuals influence the antibiotic resistance crisis. (10 marks)

Assessment focus	Band 0	Band 1	Band 2	Band 3
Understanding the influence of different organisations/ individuals.	<p>0</p> <p>Level of response not worthy of credit.</p>	<p>1-4</p> <p>Demonstrates isolated elements of knowledge of the influence of different organisations/individuals, on research and/or health issue, with major gaps or omissions.</p>	<p>5-7</p> <p>Demonstrates mostly accurate knowledge and understanding of the influence of different organisations/individuals on research and health issues.</p>	<p>8-10</p> <p>Demonstrates accurate and detailed knowledge and understanding of the influence of different organisations/individuals research and health issues.</p>
		<p>A basic explanation of how the organisation/individual may have an influence is given, but with general statements made and limited links to the article.</p>	<p>An explanation of how these organisations/individuals may influence the issue is given, occasionally supported through some linkage and application to the article.</p>	<p>An explanation of how these organisations/individuals may influence the issue is given, supported throughout with linkage and application to the article.</p>

Activity 4: Suggest potential areas for further development and/or research of the antibiotic resistance crisis. (6 marks)

Assessment focus	Band 0	Band 1	Band 2	Band 3
	0	1-2	3-4	5-6
Application of understanding to identify areas for further development and/or research	Level of response not worthy of credit.	Demonstrates isolated elements of knowledge of the health issue.	Demonstrates mostly accurate knowledge and understanding of the health issue.	Demonstrates accurate and detailed knowledge and understanding of the health issue.
		Limited identification of areas for further development and/or research	A description for further areas of development and/or research is given, occasionally supported through some linkage and application to the article.	A description for further areas of development and/or research is given, supported throughout with linkage and application to the article.

Activity 5: A recent news headline said: 'Patients with colds demand antibiotics from doctors'.

You have been asked to write an article for patients to raise awareness of antibiotic resistance. (16 marks)

Assessment focus	Band 0	Band 1	Band 2	Band 3	Band 4
Synthesises content ideas and demonstrates an understanding of scientific reporting.	0	1-4	5-8	9-12	13-16
	Level of response not worthy of credit.	Identifies some of the key information from the articles.	Summarises the key information and evidence from the articles.	Summarises and attempts to draw together key information using common elements from the articles.	Summarises and consistently draws together key information using common elements from the articles.
		Demonstrates limited understanding of audience or purpose.	Demonstrates some understanding of audience and purpose by some appropriate use of writing style and terminology.	Demonstrates good understanding of audience and purpose by using mostly appropriate writing style and terminology.	Demonstrates comprehensive understanding of audience and purpose by using appropriate writing style and terminology throughout.
	The response will be unstructured and limited to basic points made.	The response shows some structure and coherence.	The response shows a structure that is mostly clear, coherent and logical.	The response shows a well-developed structure that is clear, coherent and logical.	

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