

TB incidence and prevention – Exam style question

Introduction

This question requires the interpretation of a graph showing trends in TB incidence. It then considers vaccination and the use of healthy volunteers in trials.

Note that parts of this activity are drawn from previous SPU exams. Other parts, while being in the style of an exam question, have not been subject to the careful evaluation and revision of questions undertaken by AQA during the preparation of operational exam papers.

a	i	<ul style="list-style-type: none"> • More new cases each year • Higher incidence 	<i>any 1 for 1 mark</i>	1
	ii	<ul style="list-style-type: none"> • Same number of new cases each year 2000 to 2005 • Rate of increase has slowed/fallen to zero/dropping • Rate of increase was very high in 1995 • Change in trend indicates some measure is working 	<i>any 2 for 1 mark each</i>	2
	iii	<ul style="list-style-type: none"> • Not all new cases detected • People with TB may not go to doctor/clinic • No medical/diagnostic services available • Misdiagnosis/ poor record keeping 	<i>any 1 for 1 mark</i>	1
	iv	<ul style="list-style-type: none"> • Incidence is a ratio/ number per 100 000 • Total number depends on population • World population is increasing 	<i>any 2 for 1 mark each</i>	2
b		<ul style="list-style-type: none"> • HIV positive people more susceptible/ more HIV in Africa • Overcrowded housing increases infection rates • Less access to curative drugs means infected people in Africa spread disease for longer time period • Less likely to be diagnosed quickly/at all in Africa • people with poorer nutrition and general health are more susceptible to infection/ have weaker immune response 	<i>any 2 for 1 mark each</i>	2
c	(i)	<ul style="list-style-type: none"> • weakened/dead form of bacteria/microbe/virus • immune <u>system</u> destroys/produces antibodies/white cells • more rapid/ effective response/immune response, on next infection/ 	<i>any 2 for 1 mark each</i>	2
	(ii)			6
				16

- (c) (ii) The marking scheme for this section includes an overall assessment for the quality of written communication. There are no discrete marks for the assessment of written communication but quality of written communication will be one of the criteria used to assign the answer to one of the three levels.

Examples of the sort of information or ideas that might be used to support an argument

- important to seek full information first
- example of information needed

Yes

- humanitarian grounds
- essential to test for side effects under controlled experimental conditions
- overall risk low/ only one serious case in many years
- they monitor volunteers very carefully
- a way to make money and help

No

- animals not a good model so no guarantee of safety
- low risk but potentially serious/ reference to recent case
- should test on those who will benefit/some other reasonable suggestion on who
- danger that money paid to volunteers will encourage risk taking

Level	Descriptor	Mark range	Level guidance for this question
3	Good An answer will meet most of the criteria given in the level descriptor Claims supported by an appropriate range of evidence Good use of information or ideas about science going beyond those given in the question Argument well structured with minimal repetition or irrelevant points Accurate and clear expression of ideas with only minor errors of grammar, punctuation and spelling	5 - 6	all 3 points in bold use structure/appropriate language for 5/6
2	Modest Claims partially supported by evidence Good use of information or ideas about science given in the question but limited beyond this The argument shows some attempt at structure The ideas are expressed with reasonable clarity but with a few errors of grammar, punctuation and spelling	3 - 4	any 3 points use structure /language for 3/4
1	Limited Valid points but not clearly linked to an argument structure Limited use of new information or ideas about science Unstructured Errors in grammar, punctuation and spelling or lack of fluency	1 - 2	any 2 points, quality of explanation and language for 1/2
0	Incorrect or no response	0	

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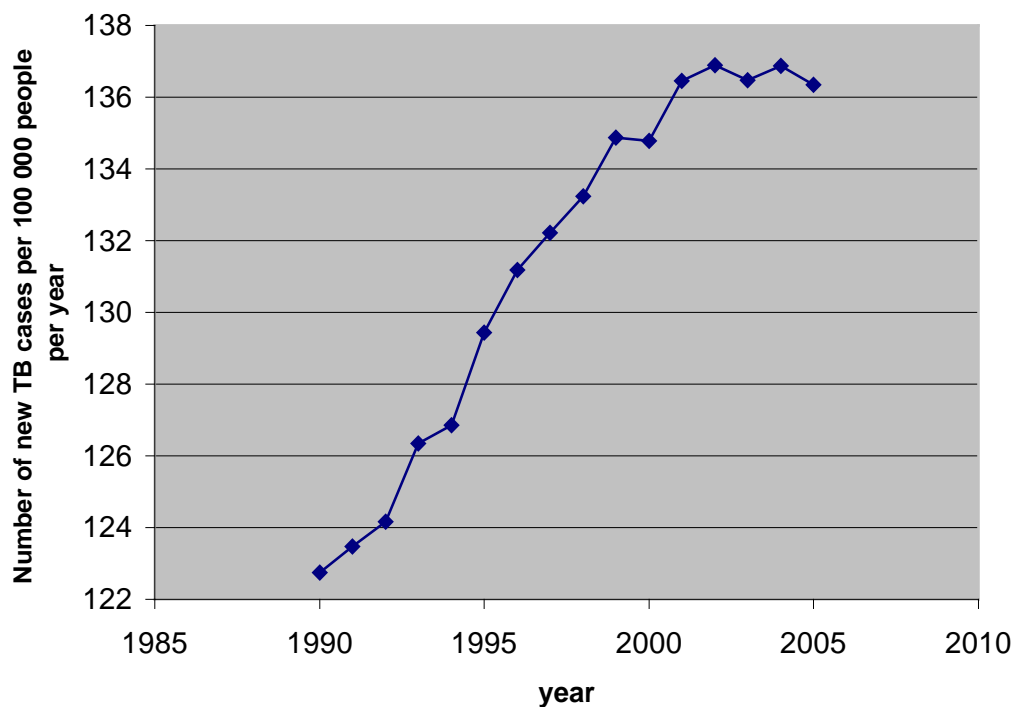
Introduction

This question is similar to Unit 1 questions in the exam.

Question

Tuberculosis (TB) is mainly an illness of the respiratory system, and is spread by coughing, sneezing and spitting. Each year about 1.6 million people world-wide die from this curable disease.

Figure 1
Global incidence of new TB cases per year



(a) (i) Describe **one** way in which the data in **Figure 1** indicate that the situation was worse in 2005 than in 1995.

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(1 mark)

(ii) Describe and explain **one** way in which the data in **Figure 1** indicate that the situation was better in 2005 than in 1995.

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.....

(2 marks)

(iii) Give **one** possible source of error in the data in **Figure 1**.

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(1 mark)

(iv) In 2008 the United Nations reported that the incidence of new TB cases per 100 000 has fallen but the total number of new cases of TB in the World increased. Explain the reason for this difference.

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(2 marks)

(b) The data in Figure 1 are global averages, but there are large variations in different regions of the World. These range from about an incidence of about 20 in high income countries to about 400 per 100,000 in some African countries.

Suggest **two** reasons for the differences.

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(2 marks)

(c) There is a vaccine against TB, known as BCG.

(i) Explain how a vaccine works to prevent infection.

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(2 marks)

(ii) The BCG vaccine is not very effective, particularly in regions of the world where the incidence of TB is growing fastest.

Recently there has been research to develop a better vaccine. Several vaccines were tested on animals and then in healthy volunteers.

If a friend was thinking of volunteering for a trial of a new TB vaccine as a healthy volunteer would you encourage or discourage him or her?

Present the arguments you would use.

Quality of written communication will be taken into account in awarding marks.

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(6 marks)