Question Number	Answer	Acceptable answers	Mark
1(a)(i)1	immune (1)		(1)

Question Number	Answer	Acceptable answers	Mark
1(a)(i)2	memory lymphocytes (1)		(1)

Question Number	Answer	Acceptable answers	Mark
<b>1</b> (a)(ii)	<b>B</b> hybridomas		(1)

Question	Answer	Acceptable answers	Mark
Number			
	Two of the following:		
1(a)(iii)			
	pregnancy testing (1)		
	locating the position of blood clots (1)	accept detecting blood clots	
	locating the position of cancers (1)	accept detecting cancer cells	(2)

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	A comparison including two from:  first response	or a second response	
		accept comparisons of data ignore references to decrease in antibody number	(2)

Question Number	Answer	Acceptable answers	Mark
<b>1</b> (b)(ii)	faster recovery / {no/less} symptoms of infection / increased chance of survival / kills pathogen faster(1)	accept more memory lymphocytes produced/ immune / fights infection faster	
			(1)

Question Number	Answer	Acceptable answers	Mark
1(b)(iii)	<b>B</b> Edward Jenner		(1)

(Total for question 1 = 9 marks)

Question	Answer	Acceptable answers	Mark
Number			
2(a)(i)	(1600 + 1000) - (1400 + 200) Or 2600 - 1600 Or (1600 - 1400) + (1000 - 200) or 200 + 800 (1)	2 marks for bald answer	
	= 1000	- 1000	(2)

Question Number	Answer	Acceptable answers	Mark
2(a)(ii)	Description including <b>two</b> of the following:		
	<ul> <li>no (overall) / little effect on cases of meningitis B (1)</li> </ul>	fluctuates a little / rises and then goes slightly down	
	<ul> <li>(significant overall)     decrease in meningitis C     (1)</li> </ul>		(2)
	<ul> <li>correct manipulation of data (1)</li> </ul>		(2)

Question	Answer	Acceptable answers	Mark
Number			
<b>2</b> (b)	<b>A</b> ⊠ antigens		(1)

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	A description linking three of the following  • inject mammal / named mammal with antigen (1)	Accept animal for mammal	
	<ul> <li>(select) B lymphocytes / lymphocyte that produces the (specific) antibody / spleen cells(1)</li> </ul>	Accept B cells	
	<ul> <li>fuse with tumour / myeloma cells (1)</li> </ul>	Accept cancer cells	
	<ul> <li>(to produce a) <u>hybridoma</u> (which divide)(1)</li> </ul>		
	<ul> <li>antibodies are isolated / screened(1)</li> </ul>	Ignore antibodies produced	(3)

Question Number	Answer	Acceptable answers	Mark
<b>2</b> (c)(ii)	<ul> <li>An explanation linking two of the following:</li> <li>antibody (only) attach to cancer cell (1)</li> <li>drug / radioactive source / toxin bound to antibody / alerts immune system to target cancer cells (1)</li> </ul>		
	<ul> <li>no / fewer adverse effect to non cancerous cells (1)</li> </ul>	Accept named effect	(2)

(Total for question 2 = 10 marks)

Question	Answer	Acceptable answers	Mark
Number			
3(a)(i)	(direct) contact (with fungus) / touch / through the skin /surfaces		(1)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	antifungal	fungicide / antibiotics/ nystatin / terbinafine / itraconazole	(1)

Question	Answer	Acceptable answers	Mark
Number			
<b>3</b> (b) (i)	<b>C</b> antibiotic C		
			(1)

Question Number	Answer	Acceptable answers	Mark
3 (b)(ii)	An explanation including 3 of the following points:  • lysozymes / enzymes		
	(1)		
	• found in tears (1)	accept lungs/saliva for tears	
	hydrochloric acid (1)		
	<ul><li>in the stomach (1)</li><li>(chemical defence)</li></ul>	stomach acid (1)	
	destroy bacteria / pathogens (1)	accept viruses for pathogens	
		Ignore references to mucus	(3)

Questi		Indicative Content	Mark	
QWC	*3(c)	An explanation of how MRSA has increased since 1993 also using the evaluation of data from the graph  • the number of patients suffering from MRSA has increased / more cases of MRSA  • by over 366 000 since 1993  • data quoted from the graph  • ref to poor hygiene in hospitals  • MRSA is a bacterium that is resistant to antibiotics  • individual bacteria show variation  • when a bacterial infection is treated with antibiotics those bacteria with low resistance are destroyed first  • the more resistant bacteria survive  • if a patient stops taking the antibiotics then the resistant bacteria will live to reproduce  • the new bacteria will also be resistant to antibiotics  • these bacteria will not be able to be treated with antibiotics so the number of cases continue to rise	(6)	
Level	0	No rewardable content		
1	1 - 2	<ul> <li>a limited description of the graph only or the increase in bacteria only</li> <li>the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>spelling, punctuation and grammar are used with limited accuracy</li> </ul>		
2	3 - 4	<ul> <li>a simple description of the graph with a limited explanation of how bacteria continued to increase</li> <li>the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>spelling, punctuation and grammar are used with some accuracy</li> </ul>		
3	5 - 6	<ul> <li>spelling, punctuation and grammar are used with some accuracy</li> <li>a detailed explanation (with data) using the graph of the emergence of resistant bacteria which then reproduce, linked to antibiotic treatment</li> <li>most of the steps are identified and are in a logical order</li> <li>the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>spelling, punctuation and grammar are used with few errors</li> </ul>		

(Total for question 3 = 12 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)(i)	an increase in cases until  October and then a decrease (in the number of cases) (1)	accept an increase in cases till <b>November</b> when it decreases	(1)

Question	Answer	Acceptable answers	Mark
Number			
4(a)(ii)	1320 (1)	2 marks for correct answer	(2)
	1320 - 168 = 1152		

Question	Answer	Acceptable answers	Mark
Number			
4(b)	exponential (growth)	log / logarithmic (growth)	(1)

Question Number	Answer	Acceptable answers	Mark
4(c)	A suggestion including two of the following		(2)
	not everyone has been immunised (1)	accept no herd immunity	
	immigration introduces people who are not immunised (1)		
	immunisation not fully effective (1)	accept bacteria mutates (making immunisation ineffective)	
	immunity can decrease with age (1)	accept immunity requires boosters/loss of memory lymphocytes	

Question Number	Answer	Acceptable answers	Mark
4(d)	A description including the following		(3)
	(immunisation) introduces an antigen/(immunisation) causes an immune response (1)  (B) lymphocytes (1)  production of antibodies (1)  (the production of) memory lymphocytes (1)	accept immune system recognises an antigen (in the immunisation) ignore white blood cells	

Total for Question 4 = 9 marks

Question	Answer	Acceptable answers	Mark
Number			
5 (a)(i)	A ⊠ FSH		(1)

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	An explanation linking two of the following		(2)
	more than one egg {released / fertilised }(1)		
	multiple birth / pregnancy (1)		
	increased risk of complications for mother/babies (1)		
	OR		
	women affected by side effects (1)	accept headaches, mood swings, nausea, abdominal pain, diarrhoea, weight gain	
	treatment has to be stopped reducing chance of pregnancy (1)		
		ignore references to cost	

Question	Answer	Acceptable answers	Mark
Number			
5 (a)(iii)	<b>D</b> ⊠ progesterone		(1)

Question Number	Answer	Acceptable answers	Mark
<b>5(b)(i)</b>	An explanation linking three from the following  urine sample (1)  coloured bead attached to a (mobile monoclonal) antibody (1)		(3)
	antibody {specific to/detects/binds to} { hormone/hCG} (1) immobile antibody at test strip	accept named female sex hormones	
	colour accumulates in positive test window (1)		

Question Number	Answer	Acceptable answers	Mark
5(b)(ii)	An explanation linking two of the following		(2)
	chemotherapy/radiotherapy drug attached to the monoclonal antibody (1)		
	less use of the drug (1)		
	only binds to cancer cells/doesn't target normal cells (1)		
	reduces side effects/named side effects (1)		
		monoclonal antibody binds to {tumour markers/cancer antigens} (1)	

Question Number	Answer	Acceptable answers	Mark
5(b)(iii)	hybridoma (cell)		(1)

Total for Question 5 = 10 marks