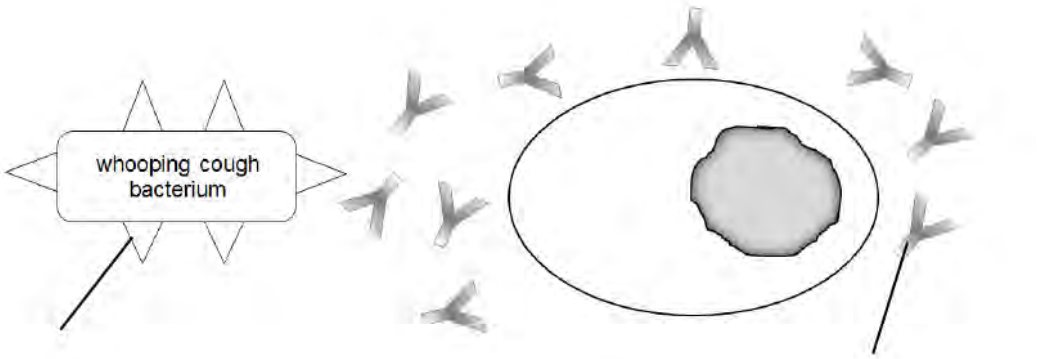
1. Whooping cough is a non-communicable bacterial infection.

The diagram below shows the blood of a person infected with whooping cough.

Label the two structures in the diagram.



(i) .....

(ii) .....

[2]

(iii) People can be vaccinated against whooping cough.

There are two types of vaccine:
Type 1 uses whole bacterial cells
Type 2 uses parts of bacterial cells.

Some people are concernd about using the Type 1 vaccine with whole bacterial cells.

Suggest why.

---

[1]

2. Swelling of the aorta is called an aneurysm. An aneurysm is repaired by inserting a plastic tube called a stent into the aorta.

In 1990, the risk of death from this operation was 5.7%.

Explain the difference between **perceived** and **calculated** risk when patients decide whether or not to have the operation.

---

[2]

3. An outbreak of Ebola virus disease started in West Africa in 2013.

When the outbreak started, no drugs were known to cure the disease.

The table shows data from several countries.

The case fatality rate is calculated using the formula:

$$\text{case fatality rate} = \frac{\text{number of deaths}}{\text{number of cases}}$$

Country	Number of cases of Ebola	Number of deaths caused by Ebola	Case fatality rate
Guinea	2871	1876	0.65
Liberia	8478	3605	0.43
Mali	8		0.75
Sierra Leone	10 340	3145	0.30

(i) Calculate the number of deaths caused by Ebola in Mali.

Show your working.

answer = _____ [2]

(ii) Look at this news headline:

Ebola kills three out of every four infected people

Explain why the headline is **not** a good summary of the data.

_____

_____

_____

_____ [2]

4(a). The MMR vaccination against measles, mumps and rubella is offered to babies in the UK when they are one year old.

In some years, fewer than 60% of parents in South Wales chose to vaccinate their babies.

Scientists think this may help to explain the shape of the graph in part **(a)**.

Put a tick (✓) in the boxes next to the **two** statements which, when put together, could explain the shape of the graph for people in South Wales.

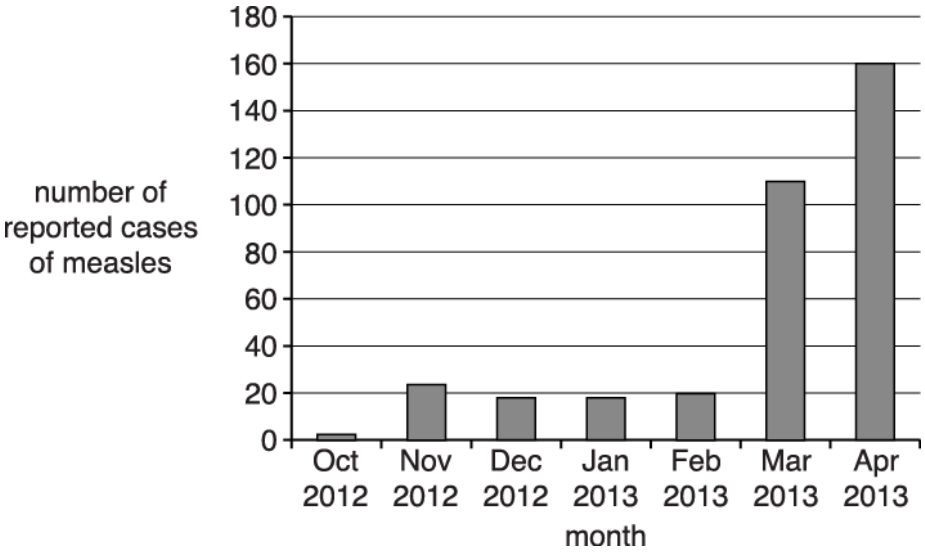
There is more chance of coming into contact with an infected person.	☐
Measles is a potentially deadly disease.	☐
More people will have the antibodies for measles.	☐
A very high uptake of the MMR vaccine could eradicate measles forever.	☐
There are more people with the measles virus.	☐
Measles can be treated by antibiotics.	☐

[2]

(b). Measles is a very infectious and potentially deadly disease.

It is caused by a virus.

The graph shows the number of measles cases reported in South Wales between October 2012 and April 2013.



(i) Calculate the percentage increase in reported cases of measles in South Wales between February and April 2013.

Show your working.

_____ % **[2]**

(ii) This data is causing concern to doctors.

Explain why.

_____

_____

_____

_____

_____

_____ **[3]**

(c). Hilary does not want to have her baby vaccinated against measles.

Hilary's friend has a high perception of risk associated with the MMR vaccine.

Explain why it is important for Hilary to consider the actual risk of the MMR vaccine rather than just listen to her friend.

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[2]

5. The female mosquito *Aedes aegypti* is responsible for the transmission of diseases such as Zika virus.

In May 2015, Zika virus was reported in Brazil and began to spread rapidly.

The mosquito feeds mainly on human blood. The virus is spread when a female *Aedes aegypti* mosquito bites an infected human and then bites an uninfected human.

Zika virus is a communicable disease.

Visitors to Brazil in 2016 were concerned that they could become infected with the virus.

There is no vaccination for this virus.

(i) Explain what a communicable disease is and suggest how a visitor to Brazil could reduce the risk of becoming infected with Zika.

---

[2]

(ii) The first ever human case of Zika was discovered in Nigeria in 1954. The timeline below shows how Zika spread.

1954		1977–78		2007		2013		2015
Nigeria	→	Pakistan, Malaysia, Indonesia	→	Micronesia	→	French Polynesia	→	Brazil

The Zika virus can also be transmitted by sexual intercourse.

People were concerned that hosting the Olympic games in Brazil in 2016 would increase the spread of the virus to other countries.

Suggest how the virus could be spread to other countries **and** how this could be prevented.

--- [2]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1		i	Antigen ✓	1	
		ii	Antibody ✓	1	
		iii	Whole cell could cause disease ✓	1	
			Total	**3**	
2			Calculated risk is 5.7% / based on data / stats / results / numbers; Perceived risk is what the patient thinks (the risks are) / opinion;	2	**Ignore** risk is calculated / probability / valueb **Ignore** doctors opinion **Examiner's Comments** This question discriminated well between candidates. Many candidates struggled with this. Good answers included responses such as perceived risk is what the patients think the risk is and calculated risk includes data/statistics/numbers. Candidates should avoid tautology such as saying perceived risk is what the patient perceives and calculated risk is what the patient calculates.
			Total	**2**	
3		i	0.75 × 8 (1) 6 (2)	2	correct answer without working = 2 marks **credit** correct answer written in the table **Examiner's Comments** The majority of candidates were able to successfully manipulate the data to work out the number of deaths.

Question			Answer/Indicative content	Marks	Guidance
		ii	any 2 from: only true for Mali / only true for one country / does not represent the full range of data / different in different countries; 0.75 is not the mean / 0.75 is not the average / 0.75 is not (close to) the true value; Mali is a small sample / 8 people is a small sample / ORA	2	do not credit "wrong / not true / not accurate / not correct" without explanation accept "it" for 0.75 do not credit unqualified ref. to not enough data (as this does not answer the question) Examiner's Comments Candidates who were able to justify in detail why the headline was not a good summary of the data scored the highest marks.
			Total	4	

Question			Answer/Indicative content	Marks	Guidance
4	a		<table><tr><td>There is more chance…</td><td>✓</td></tr><tr><td>Measles is a potentially deadly disease.</td><td></td></tr><tr><td>More people will have the antibodies for measles.</td><td></td></tr><tr><td>A very high uptake of the MMR…</td><td></td></tr><tr><td>There are more people with the measles virus.</td><td>✓</td></tr><tr><td>Measles can be treated by antibiotics.</td><td></td></tr></table>	2	More than 2 boxes ticked, negate 1 mark for each additional tick. Examiner's Comments Most candidates could successfully link the shape of the graph to the two correct explanations.
	b	i	Ref to 140 (1) 700 (2)	2	140 refers to increase Examiner's Comments The correct response was 700%.
		ii	Any three from: Rapid / big increase (in a very short time) (1) risk of an epidemic / outbreak / spreads quickly (1) risk of death / serious illness is great (1) harder to control the more it spreads (1) cannot be treated by antibiotics (1) more people need to be vaccinated / fewer people have been vaccinated (1) vaccination is not working / virus mutated / become resistant (1)	3	Examiner's Comments A good discriminator. Only some candidates were able to give three reasons why the data was of concern to doctors.
	c		Any two from perception of risk can be different to actual risk (1) perception of risk is personal / different for all / personal opinion (1) lack of scientific evidence for the friend's claim (1) idea that actual risk is scientifically calculated / estimated (1) consult a doctor / medical professional (1) risk from vaccination is smaller than effects of disease (1)	2	ignore benefits outweigh risk unqualified Examiner's Comments This question tested the full range of abilities. Many candidates could explain how actual risk is different from perceived risk. Some candidates struggled with this idea in the context of the question.
			Total	9	

Question			Answer/Indicative content	Marks	Guidance
5		i	**Max. one from:** can be spread from organism to organism ✓ spread in bodily fluids/on surfaces/ in food and water✓ spread by a pathogen/bacteria/viruses/protists/fungi ✓ **Max. one from:** reduce risk of infection by not coming into contact with the mosquito✓ using insecticide/insect repellent✓ using mosquito nets ✓ covering exposed skin ✓	2 (AO 1.1) (AO 2.1)	**ALLOW** specific examples **ALLOW** vector **ALLOW** sensible ideas to prevent infection **DO NOT ALLOW** vaccination (because the question says there is no vaccine for this virus)

Question			Answer/Indicative content	Marks	Guidance
		ii	idea of intercourse/sex with an uninfected person in a different country ✓	2 (AO 2.1)	ALLOW correct reference to transmission to uninfected via blood
			use barrier contraception/ abstain from intercourse/sex on return home ✓	(AO 1.1)	ALLOW named example of barrier contraception ALLOW example to avoid blood transmission ALLOW isolate infected/screening/restricting travel Examiner's Comments 6 (a) (i) and 6 (a) (ii) tested candidates ability to apply their knowledge of communicable diseases to an unfamiliar context. Candidates engaged well with the context and processed the information provided well. For part (a) (i) most candidates gained at least 1 mark with many good suggestions for how to prevent the spread of the virus. When both marks were not credited, this was often for an incorrect description of a communicable disease. In 6 (a) (ii) it was pleasing to see candidates thinking about the information presented to give sensible suggestions to prevent the spread of this virus globally. The most common answer given was a suggestion of using condoms, though some did lose this mark for just stating contraception without qualification. There were also some good examples of other methods that could be used to minimise spread, such as preventing travel or testing/isolation of the infected. The majority of candidates did not gain the second mark for 6 (a) (ii) for failing to explicitly stating that the infected on return from Brazil could pass the virus on to uninfected individuals by sex.
			Total	4	