

### 4-3 Infection and Response – Trilogy

1.1 Pathogens are disease-causing microorganisms.

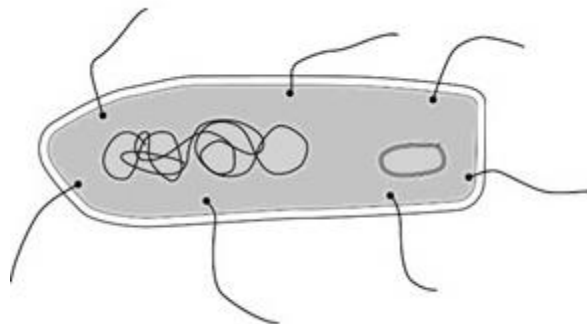
Draw **one** line from each disease to the correct disease-causing microorganism.

[3 marks]

Disease	Microorganism
Measles	Virus
Rose black spot	Bacterium
Salmonella	Fungi
	Protists

Figure 1 shows the image of a bacterial cell.

**Figure 1**



1.2 Measure the length of the image of the cell in mm.

[1 mark]

Length of image = \_\_\_\_\_ mm

1.3 The bacterial cell has been magnified 15 000 times.

Calculate the real length of the bacterial cell using your answer in 1.2.

[1 mark]

Real length of cell = \_\_\_\_\_  $\mu\text{m}$

**2.0** Drugs affect the human body.

New drugs must be tested and trialed before being used.

**2.1** New drugs are tested in a laboratory before they are trialed on people.

In a laboratory, what are new drugs tested on?

[1 mark]

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**2.2** Why is it important that drugs are trialed before doctors give them to patients?

[2 marks]

Tick **two** boxes.

- To check that the drug works
- To check the cost of the drug
- To find out if the drug is legal
- To find the best dose to use

**2.3** In a double blind drug trial, only some people know which patients have been given the drug.

Who knows which patients have been given the drug?

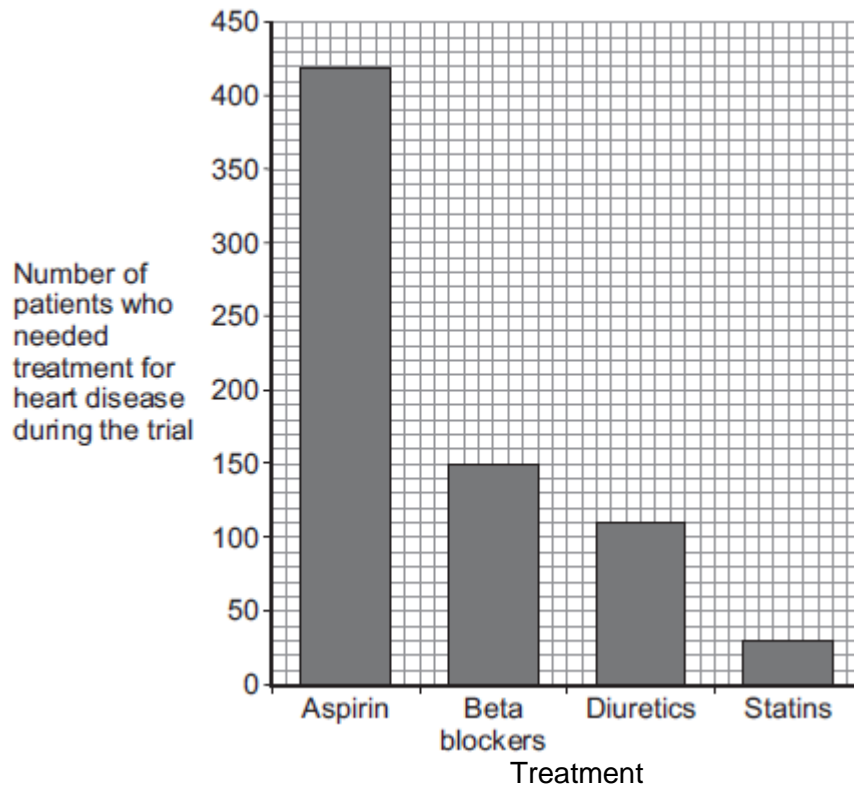
[1 mark]

Tick **one or more** boxes.

- The patient
- The doctor
- The scientists at the drug company

Doctors trialed four different treatments for reducing the risk of heart disease. Each treatment was trialed on the same number of patients for 5 years. The patients did **not** have heart disease at the start of the trial. The **Figure 2** below shows the results.

**Figure 2**



**2.4** How many patients who took aspirin needed treatment for heart disease during the trial? [1 mark]

Number of patients = \_\_\_\_\_

**2.5** Based **only** on the evidence in the graph, which would be the best treatment to reduce the risk of developing heart disease? [1 mark]

\_\_\_\_\_

**2.6** Suggest **one** other factor that a doctor might consider before deciding which treatment to use for a patient. [1 mark]

\_\_\_\_\_

**3.0** Some forms of the Human Papilloma Virus (HPV) have been shown to cause cervical cancer.

Girls aged 11 to 14 now receive a vaccine for HPV.

Explain how the HPV vaccine could reduce the incidence of cancer.

Include in your answer:

- How the immune system responds to vaccines
- How giving girls the vaccine could reduce the number who get cervical cancer.

**[6 marks]**

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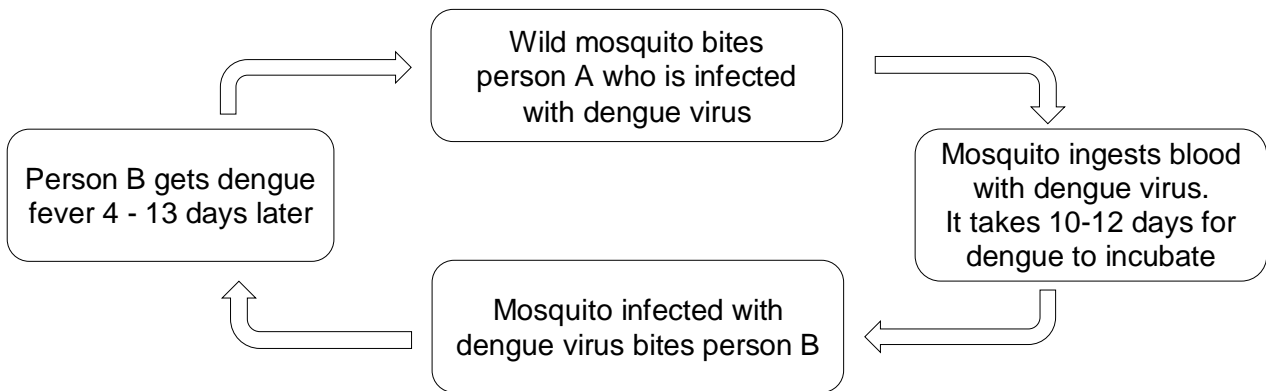
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4.0 Dengue fever is a viral disease that affects up to 100 million people each year.  
The lifecycle of the dengue virus can be summarised as:

Figure 3



4.1 The mosquito passes the virus from person to person.  
What type of organism is the mosquito in this case?

[1 mark]

Draw a ring around the correct answer.

Fungus                      Parasite                      Protist                      Vector

4.2 Brazil is a country with high levels of the dengue virus in the population.  
Give **two** ways in which people in Brazil can help prevent infection with dengue virus.

[2 marks]

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4.3 What is the minimum incubation time from person **A** being bitten to person **B** getting dengue fever?  
Use information in **Figure 3**.

[1 mark]

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**5.0** Pneumonia is a condition that causes severe breathing difficulties and can lead to death. It is usually caused by a viral or bacterial infection.

The incidence of pneumonia in people with HIV has been five to ten times higher than in people without HIV.

**5.1** Suggest why the incidence of pneumonia is higher in people with HIV.

[2 marks]

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**5.2** Atazanavir is a drug used to treat people with HIV.

Suggest what type of drug Atazanavir is.

[1 mark]

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**5.3** Scientists are trying to make a vaccine against HIV.

A vaccine to protect against HIV could be made using only a small part of the virus rather than a weakened form of the whole virus.

There would be **no** whole virus in the vaccine.

Suggest **two** advantages of using this type of vaccine.

[2 marks]

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**5.4** Tobacco Mosaic Virus affects plants.

Plants infected with Tobacco Mosaic Virus are often smaller than healthy plants.

Explain why.

[4 marks]

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## MARK SCHEME

Qu No.		Extra Information	Marks
1.1	Measles – virus Rose black spot – fungi Salmonella - bacterium	One mark per disease correctly matched	3
1.2	60 (mm)		1
1.3	4 (µm)	allow ecf using candidates answer to 1.2	1

Qu No.		Extra Information	Marks
2.1	any <b>one</b> from, • (live) animals • cells • tissues	ignore people / volunteers allow named examples, e.g. mice  do not allow plants	1
2.2	to check that the drug works to find the best dose to use		1 1
2.3	the scientists at the drug company		1
2.4	420		1
2.5	Statins		1
2.6	any <b>one</b> from, • side effects • other medication (they are taking) • other medical conditions	allow family history / age allow patient choice	1

Qu No.	3	Extra Information	Marks
<b>Level 3:</b>	A detailed and coherent explanation is given. The student links the details of the immune response to the prevention of spread of cervical cancer. Logical links are made and scientific terms are used accurately.		5–6
<b>Level 2:</b>	A logical description is given of most of the stages of the immune response to HPV. The answer is not linked to the prevention of the spread of disease.		3–4
<b>Level 1:</b>	Some relevant points made which do not cover the entire process. The logic may be unclear and links may not be made.		1–2
	No relevant content		0
	<b>Indicative content</b>		
	<ul style="list-style-type: none"> <li>Vaccination involves introducing small quantities of dead or inactive forms of <u>HPV</u>;</li> <li>Stimulate the <u>white blood cells</u>;</li> <li>To produce <u>antibodies</u> against HPV;</li> <li>Memory cells for the HPV (antigen) is produced;</li> <li>If infected, antibodies against HPV are produced faster;</li> <li>Stops infection with the <u>virus</u> / HPV;</li> <li>Girls who get the vaccine less likely to get cancer;</li> <li>Lower likelihood that virus spread via sexual contact;</li> </ul>	do <b>not</b> allow small amount of HPV  allow lymphocytes / B-cells allow immunoglobulins  allow kill / destroy virus	

	<ul style="list-style-type: none"> <li>and so prevent spread cervical cancer even to those who haven't received the vaccine.</li> </ul>		
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Qu No.		Extra Information	Marks
4.1	Vector		1
4.2	destroy the mosquitoes		1
	prevent the mosquitoes from biting people	allow use mosquito repellent / nets	1
4.3	14 days		1

Qu No.		Extra Information	Marks
5.1	immune system becomes severely damaged		1
	so white blood cells can no longer destroy the pathogen (unlike a person without HIV)		1
5.2	antiretroviral		1
5.3	safer / no risk of getting the disease		1
	it can't reproduce		1
5.4	parts of the leaf have no chlorophyll / chloroplasts		1
	(so) less light is absorbed for photosynthesis		1
	(therefore) less glucose made from photosynthesis		1
	(and so) fewer proteins made (from glucose) for growth		1