-- Question --

3 Read the following paragraph and answer the questions.

> In November 2002, severe acute respiratory syndrome (SARS) was spotted first in China. It sickened 8096 and killed 774 worldwide by July 2003. In 2004, the vaccines, containing inactivated SARS-causing viruses, were first tested in humans in a clinical trial. None of the healthy volunteers had abnormal reactions and antibodies against SARS-causing viruses were detected in their blood. In the coming trial, researchers hope to find out how long the antibodies can stay in the volunteers.

a Explain why antibodies against SARS-causing viruses were detected in the blood of the volunteers. (3 marks)

b How may the vaccines mentioned above provide protection against SARS? (4 marks)

c Apart from inactivated SARS-causing viruses, suggest ***one*** other active ingredient for making vaccines against SARS. (1 mark)

d Explain why the volunteers chosen for the clinical trials must not be sick at the time of vaccination. (2 marks)

-- Answer --

a Antigens of the inactivated SARS-causing viruses in the vaccines fitted in the receptors of B cells. 1m

The activated B cells divided and some of them differentiated into plasma cells. 1m

Plasma cells released antibodies against SARS-causing viruses. 1m

b Memory cells are produced after the injection of vaccines. Memory cells remember the antigens on the SARS-causing viruses. 1m

When the SARS-causing viruses enter the body again, the memory cells quickly multiply and differentiate into a large number of plasma cells, killer T cells and memory cells. 1m

The secondary response is faster, stronger and lasts longer than the primary response. 1m

Therefore, the body will show an enhanced immunity to SARS. 1m

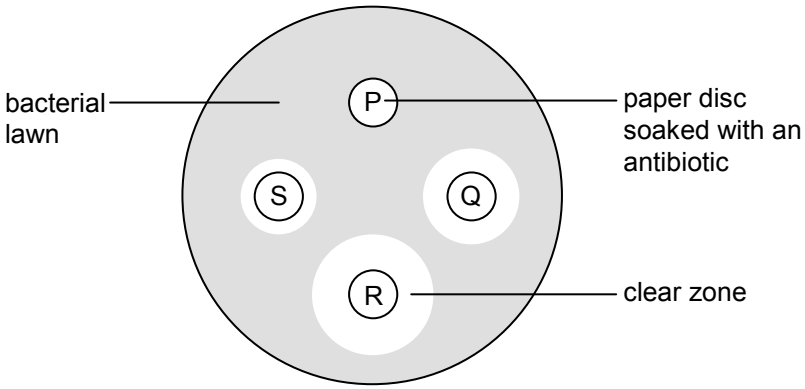
c Surface protein of the SARS-causing virus 1m

d When people are sick, their immunity is weak. 1m

They may be infected by the inactivated viruses in the vaccines. 1m

-- Question --

4 An investigation was carried out to study the effectiveness of four antibiotics. Paper discs soaked with four different antibiotics (P, Q, R and S) were put on an agar plate spread with a species of bacteria. The agar plate was then incubated at 30 °C for 2 days. The diagram below shows the results.



a Explain why clear zones appeared around some paper discs. (2 marks)

b Based on the results, evaluate which antibiotic is most effective against this species of bacteria. Explain briefly. (2 marks)

c Apart from the effectiveness of antibiotics, state ***one*** other feature of the antibiotics which affects the size of the clear zones. (1 mark)

-- Answer --

a	Antibiotics diffused from the paper discs into the agar	1m
	and inhibited the growth of bacteria in the areas around the discs.	1m
b	R is most effective.	1m
	The clear zone around the paper disc soaked with R was the largest.	1m
c	Size of the antibiotic molecule	1m