1 Read the passage below. Use the information in the passage and your own knowledge to answer the questions that follow.

Maggots and Wound Healing

The photograph shows maggots eating dead tissue at a human wound.



At the beginning of the 20th century maggots were widely used to treat wounds. When penicillin started to be used in the 1940s, the use of maggots to treat infections by killing bacteria declined. However, the recent increase in infections caused by antibiotic resistant bacteria such as MRSA (methicillin resistant *Staphylococcus aureus*) is creating renewed interest in maggots.

The maggots used in hospitals to treat wounds are bred in a sterile environment. Green blowfly maggots are used as this species only digests dead tissue and does not burrow down into live flesh.

It is not fully understood how the maggots work but there are several theories. The first theory is that they produce an antibiotic in their gut called mirabilicide, which kills the bacteria they eat. A second theory is that the maggots secrete enzymes to break down dead tissue, and digest bacteria in the process. A third theory is that the maggots secrete ammonia as a waste product which changes the pH of the wound, making it unfavourable for bacteria to reproduce.

Using maggots to treat a wound also helps to speed up the production of new tissue. One hypothesis is that the wriggling movement of maggots acts as the stimulus, but there is little evidence to support this view. A more likely explanation is that the maggots, or their products, stimulate the body's immune system to kill bacteria in the wound and allow the healing process to occur.

Doctors have developed a 'maggot bag', for applying the maggots to wounds. The bags take longer to work than if the maggots are free to move in the wound, so are less useful if the wound needs to be treated quickly. It is expensive to use maggot bags because they cost much more than a typical wound dressing.

(a) (i) State what is meant by the term **antibiotic** (line 5).

(1)

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(ii) Name two of the antibiotics mentioned in the passage.

(1)

1 .....

2 .....

(b) (i) Suggest why maggots are bred in a sterile environment (line 7).

(1)

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(ii) Why are green blowfly maggots chosen to treat wounds (line 8)?

(1)

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(c) Suggest the name of an enzyme used by maggots to digest bacteria (line 13).

(1)

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(d) Describe how the body's immune system kills bacteria (lines 19 and 20).

(4)

(e) Give a disadvantage of using maggot bags to treat wounds (lines 22 to 24).

(1)

(f) Use your knowledge of natural selection to explain why there has been an increase in the number of MRSA bacteria (line 5).

(4)

(Total for Question = 14 marks)