COMPREHENSION EXERCISE 1

Read the following passage and then answer the questions that follow:-

BACTERIAL FRIENDS

Many micro-organisms are essential for soil fertility and have symbiotic relationships with crop plants. The role played by rhizobial bacteria is of particular interest. These bacteria form nodules on the roots of legumes such as peas and beans. From within these nodules they supply the plant with a usable form of nitrogen, “fixed” from atmospheric nitrogen.

Scientists are trying to transfer the genes which trigger the formation of nodules and nitrogen fixation capability to non-legume crops such as cereals. Such a transfer would dramatically reduce the need for inorganic nitrogen fertilisers which would have positive economic and environmental outcomes by saving money and reducing the chance of nitrogenous fertilisers leaching into ground waters. It would also help overall sustainability because the energy needed to produce nitrogen fertilisers is estimated to constitute half of all fossil fuel usage in modern agriculture.

(Adapted from *Food Security, microbiology and research in Microbiology Today Aug 2010)*

1. Give two examples of legumes mentioned in the passage. 3
2. What is meant by the term “symbiotic relationship”? 3
3. Suggest how the bacteria may benefit from their relationship with the pea/bean plant. 3
4. Rhizobial bacteria “fix” atmospheric nitrogen. Where does this take place? 3
5. Give an example of a symbiotic relationship (other than the one listed in the passage) stating the organisms involved and the how each organism benefits or loses in the relationship. 9
6. Identify the “usable form of nitrogen” mentioned above. 3
7. What is the immediate fate of this “usable form of nitrogen”? 3
8. What is the term for artificially transferring genes between organisms? 3
9. LIST the steps involved in this process and explain any ONE step you have listed. 15
10. Why is the leaching of nitrogen containing fertilisers into ground water a cause for concern?9
11. Write a paragraph on the negative environmental consequences that the increased use of fossil fuels are thought to have. 6
12. To which kingdom do bacteria belong? 3
13. Are bacteria prokaryotes or eukaryotes? Give a reason for your answer. 6
14. Summarise the nitrogen cycle in a diagram. 12
15. Suggest a reason why farmers are encouraged to grow legumes in rotation with other crops. 3
16. Which food type contains nitrogen? 3
17. Detail how to test a food sample for this food type. 3
18. “If all bacteria on the planet were wiped out, all other life would eventually cease also” Do you agree with this statement? Give reasons for your answer. 9