

## Genetic Engineering

**Q1** Genetically engineered animals can be used to produce useful products.

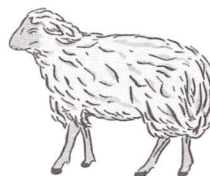
a) **Malaria** is a disease which is spread by **mosquitoes**.



**Explain** how through **genetic engineering**, mosquitoes can be used to help in the fight **against** malaria.

b) Genetically engineered **sheep** can produce useful substances, such as medicinal drugs.

**How** are these substances collected from the sheep?



**Q2** Read the following article about **insulin** production.

Insulin is a hormone that is used to treat sufferers of diabetes. The hormone is naturally produced in small quantities in the bodies of animals (including humans). It was previously extracted from domesticated animals, such as pigs. Today insulin is produced by **bacteria**. DNA from animals can be inserted into bacteria cells. The DNA instructs the bacteria to produce insulin.

a) The bacteria that produce insulin have been **genetically engineered**. **Explain** what this means.

b) Name another **useful substance** that is produced by genetically engineered bacteria.

**Q3** Crop plants can be **genetically engineered** to make them resistant to weedkillers. A gene for **weedkiller-resistance** is put into some bacteria, and the bacteria are then allowed to infect a plant. In the right conditions, the bacteria will insert the weedkiller-resistance gene into the plant's genome.



a) **Describe** the procedure for inserting a gene for weedkiller resistance into bacteria.

b) What is the **advantage** of having crop plants that are resistant to weedkillers?