

section ③ Biotechnology

What You'll Learn

- the importance of advances in genetics
- the steps in making genetically engineered organisms

● Before You Read

Describe on the lines below what you have heard or read about recent advances in medical research.

 Mark the Text

Identify Main Points

Highlight the main idea in each paragraph. Underline the details that support the main idea.

● Read to Learn

Why is genetics important?

New developments in genetic research are happening all the time. The principles of heredity are being used to change the world.

Genetic Engineering

Genetic engineering is the use of biological and chemical methods to change the arrangement of DNA that makes up a gene. One use for genetic engineering is to produce large amounts of different medicines. Genes also can be inserted into cells to change how those cells perform their normal functions. Genetic engineering researchers are also looking for new ways to improve crop production and quality.

How is recombinant DNA made?


Making recombinant DNA is one method of genetic engineering. Recombinant DNA is made by inserting a useful section of DNA from one organism into a bacterium. This process is used to make large amounts of insulin, which is used to treat diabetes. Other uses include the production of a growth hormone to treat dwarfism and chemicals used to treat cancer.

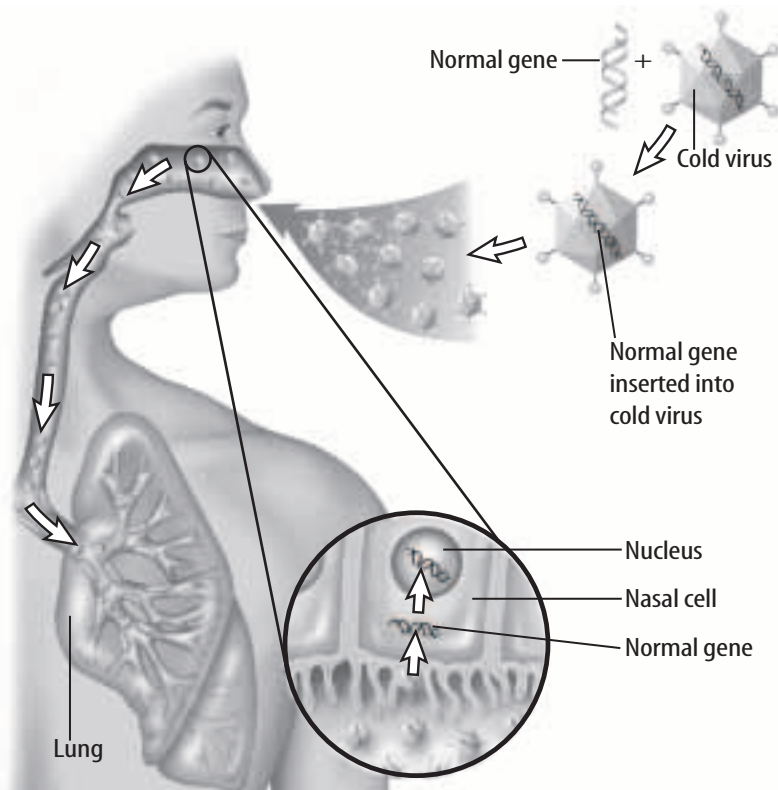
FOLDABLES™

● **Describe** Make a three-tab book, as shown below. Use the Foldable to describe genetic engineering, recombinant DNA, and gene therapy.



How does gene transfer work?

Another application of genetic-engineering is gene transfer. A goal of this experimental procedure is to replace abnormal genetic material with normal genetic material. First, normal DNA or RNA is placed in a virus. Then the virus delivers the normal DNA or RNA to target cells, as shown in the figure below. Gene transfer, also known as gene therapy, might help correct genetic disorders such as cystic fibrosis. It also is being studied as a possible treatment for cancer, heart disease, and certain infectious diseases. 



How are plants genetically engineered?

Before people knew about genotypes, they selected plants with the most desired traits to breed for the next generation. This process is called selective breeding. Today people also use genetic engineering to improve crop plants. One method is to find the genes that produce desired traits in one plant and then insert those genes into a different plant. Scientists recently made genetically engineered tomatoes with a gene that allows them to be picked green. As these tomatoes are being sent to stores, they continue to ripen. You can then buy ripe, firm tomatoes in the store. The long-term effects of eating genetically engineered plants are not known.

Reading Check

1. **Identify** What is replaced in gene therapy?

Picture This

2. **Explain** Use the figure to explain to a partner how gene therapy works.

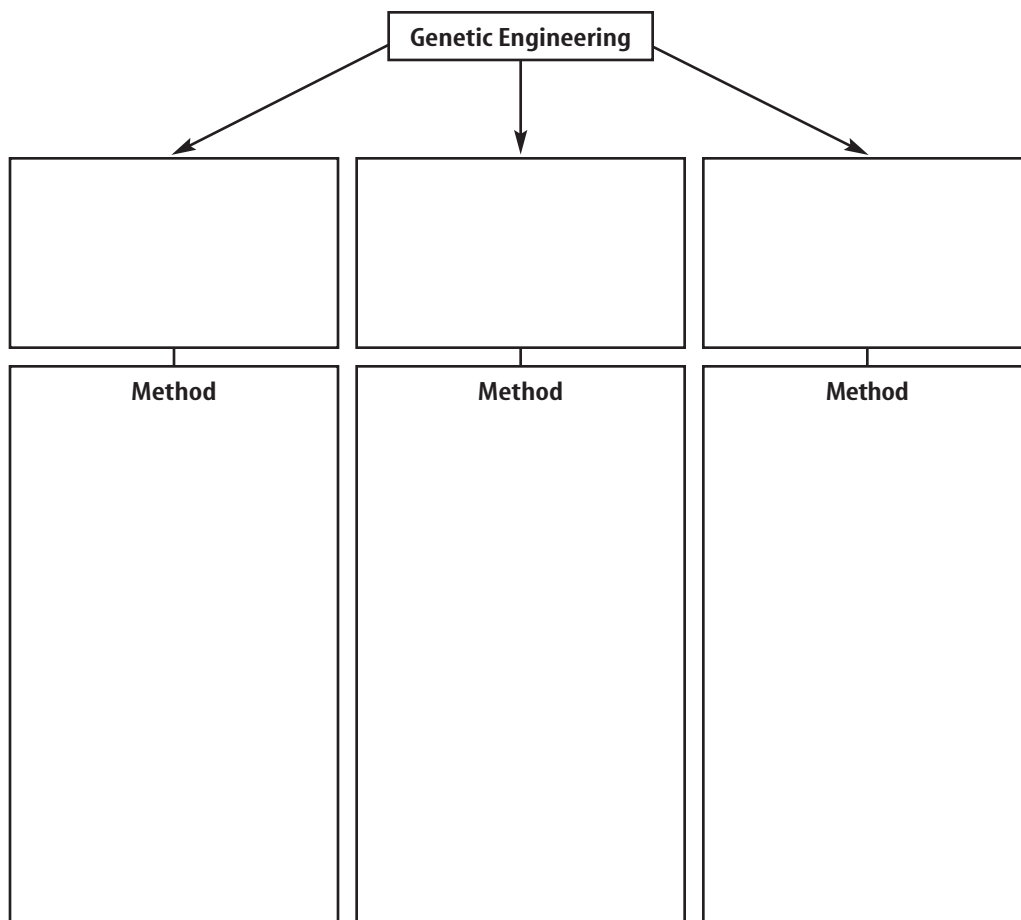
● After You Read

Mini Glossary

genetic engineering: biological and chemical methods to change the arrangement of DNA that makes up a gene

1. Review the term and its definition in the Mini Glossary. Write a sentence that explains how genetic engineering can improve crop plants.

2. Complete the concept web below to show three kinds of genetic engineering and the methods used to carry them out.



Copyright © Glencoe/McGraw-Hill, a division of The McGraw-Hill Companies, Inc.



Visit life.msscience.com to access your textbook, interactive games, and projects to help you learn more about advances in genetics.