

# Moving genes

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| <b>Focus question</b> | How do we use plasmids to genetically modify bacteria?   |
| <b>Vocabulary</b>     | Phenotype, genotype, plasmid vector, gene of interest, heat shock, promoter, restriction enzymes |

## Procedure

Genetic modification is different than crossing different varieties of the same plant species. It is taking a gene from one species and inserting it into the genetic material of another, different species. This is what makes it so specific. We have been able to modify bacteria to produce insulin for humans that is genetically identical to the insulin produced in a human pancreas. How is this possible?

Scientists have been able to isolate genes that code for specific traits through genome sequencing (discovering the DNA sequence of an entire organism). Proteins, called **restriction enzymes**, have been discovered and used to cut out the desired gene from the strand of DNA. Scientists have also used various bacteria to act as **vectors** that can carry genetic material. Bacteria are ideal species for these vectors, as they contain chromosomal DNA and **plasmid** DNA. A **plasmid** is a circular piece of DNA that is found naturally in bacteria. These plasmids can replicate when the bacterium replicates and may be composed of as few as 1,000 or up to 20,000 nucleotides. The genes on the plasmid are part of the traits expressed by the bacterium, perhaps helping it to resist antibiotics, or produce a toxin.

The set of cards contain the basic steps in using plasmid vectors to transform bacteria.

1. Arrange the illustrated cards in order to show your understanding of how genes are moved from one organism to another.
2. Provide an explanation as to why this is the correct arrangement by describing the steps in your own words.

## Rubric for self-assessment

| Skill   | Yes | No | Unsure |
|---|-----|----|--------|
| My group was able to properly sequence the steps in moving genes. |     |    |        |
| I can explain the steps in moving genes.                          |     |    |        |