

## Additional Activity: Switched at Birth! DNA Fingerprinting: An Application

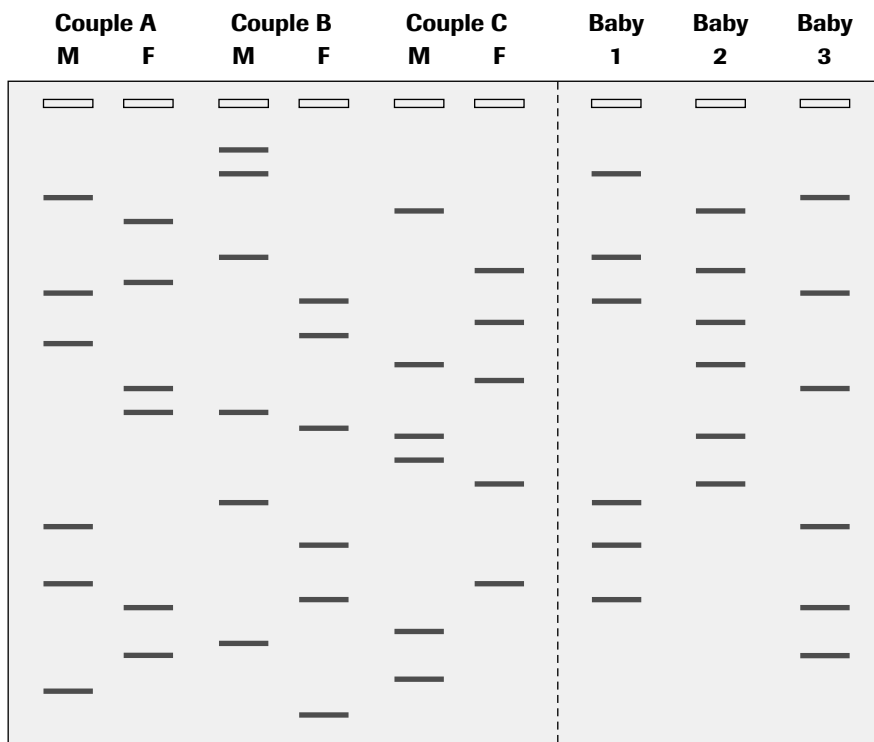
Although a rare occurrence, cases of babies switched at birth in a hospital have made the news in the past. Since an individual's DNA sequence is unique, with the exception of identical twins, DNA fingerprinting is a reliable method used to determine the parents of a given baby. DNA fingerprints can be derived from restriction fragment-length polymorphism analysis or using the polymerase chain reaction with variable number tandem repeats. In this activity, you will analyze the results of a DNA fingerprint conducted on three babies and three sets of parents to determine which baby belongs to which parent.

### Materials

photocopy of worksheets                      pencil  
ruler

### Procedure

1. Compare the bands of each set of parents to each of the babies and determine which baby belongs to which set of parents. Line up the bands and illustrate which bands each baby inherited from its mother and from its father.



**Figure 1**  
DNA fingerprint data obtained from three sets of infants and three sets of parents

*(continued)*

**Analysis and Synthesis**

- (a) Identify which baby belongs to which set of parents.
  
- (b) Explain why not all the bands in the mother's or father's profiles have a counterpart in the baby's DNA profile.
  
- (c) List other examples where DNA fingerprinting could be used to identify an individual.
  
- (d) Explain why blood typing may not be a viable method of determining which baby belongs to which parent.
  
- (e) Identify the largest DNA fragment on the gel. Identify the smallest DNA fragment on the gel.

## Additional Activity: Switched at Birth! DNA Fingerprinting: An Application, Solution

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### Analysis and Synthesis

- (a) Couple A are the parents of Baby 3. Couple B are the parents of Baby 1. Couple C are the parents of Baby 2.
- (b) Not all the bands in a given mother's or father's DNA profile will have a counterpart in their baby's profile since a child does not inherit 100% of a parent's DNA. A child inherits 50% of its DNA from the mother and 50% of its DNA from the father; hence some of the parental DNA is not passed along to the child. Also, during meiosis, crossover of genetic material occurs, resulting in alterations of DNA sequences, thereby resulting in different DNA sequences for the child compared with the parent.
- (c) DNA fingerprinting could be used to exonerate or to convict suspected criminals. DNA fingerprinting could also be used to build phylogenetic trees between species. In addition, DNA fingerprinting could be used to identify individuals that are not necessarily identifiable using any other means (for example, a badly burned individuals involved in an automobile accident).
- (d) Blood typing may not be a viable method of determining which baby belongs to which set of parents since blood typing does not distinguish between people of different genotypes. For example, a person may be Type B blood but that person could either be BO or BB.
- (e) The largest DNA fragment on the gel belongs to the mother of Couple B and Baby 1 found at the top of the gel. The smallest fragment on the gel belongs to the father or Couple B found at the bottom of the gel.