Using Blood Types for Identification

Students are presented with the problem of determining which of two babies belongs to each of two sets of parents based on their blood types. To solve the problem, students will apply concepts they have learned about blood type and inheritance.

◆ Expected Outcome

Students should identify all of the possible genotypes of the individuals involved, draw four Punnett squares to represent each possible mating, and complete the Punnett squares to identify all the possible genotypes of children from each mating. From their completed Punnett squares, students should conclude that only Mr. and Mrs. Iten could have a baby of blood type O (Baby 2), so Mr. and Mrs. Iben must be the parents of the baby with blood type A (Baby 1).

◆ Content Assessed

This activity assesses students' understanding of ABO blood types and the use of Punnett squares to trace the inheritance of genes from parents to offspring.

◆ Skills Assessed

interpreting data, making diagrams, drawing conclusions

◆ Materials

- Other than paper and pencils, no special materials are required for this assessment.
- You may want to provide students with scratch paper for drawing their Punnett squares.

◆ Advance Preparation

- If you put the blood type data on the board in the form of a table, it will be easier for students to work with.

◆ Time

30 minutes

◆ Monitoring the Task

- Make sure that students have correctly identified both of the possible genotypes (I^AI^A and I^Ai) for Mr. and Mrs. Iten.
- Students should draw a total of four Punnett squares, one for each of the following mating types: $I^AI^B \times ii$ for Mr. and Mrs. Iben; and $I^AI^A \times I^AI^A$, $I^Ai \times I^AI^A$, and $I^Ai \times I^Ai$ for Mr. and Mrs. Iten. Check that students have completed each Punnett square correctly to show all of the possible genotypes in the children of each couple.

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In assessing students' performance, use the following rubric.

	4	*3*	*2*	*1*
Using Punnett Squares	The student's Punnett squares are complete and contain no errors, and the student correctly identifies the baby that belongs to each set of parents.	The student's Punnett squares are complete and have only one or two minor errors, and the student correctly identifies the baby that belongs to each set of parents.	The student's Punnett squares contain several errors, and the student may not be able to correctly identify the baby that belongs to each set of parents.	The student's Punnett squares are incomplete and contain many errors, and the student cannot correctly identify the baby that belongs to each set of parents.
Concept Understanding	The student demonstrates a mastery of the concepts underlying the problem, including blood type and the inheritance of multiple alleles.	The student demonstrates a good understanding of the concepts underlying the problem, including blood type and the inheritance of multiple alleles.	The student demonstrates a partial understanding of the concepts underlying the problem, including blood type and the inheritance of multiple alleles.	The student demonstrates little understanding of the concepts underlying the problem, including blood type and the inheritance of multiple alleles.

Name _____ Date _____ Class _____

PERFORMANCE ASSESSMENT

Using Blood Types for Identification

◆ Problem

Mrs. Iben and Mrs. Iten shared a room at the hospital when they had their babies, and now they suspect their babies have been accidentally switched. The hospital performed blood tests that showed the following blood types: Mrs. Iben, AB; Mr. Iben, O; Mrs. Iten, A; Mr. Iten, A; Baby 1, A; Baby 2, O. Based on the blood types, can you determine which baby belongs to each set of parents?

◆ Suggested Materials

Punnett squares

◆ Devise a Plan

1. Read the problem carefully and decide how you can use Punnett squares to solve it.
2. Describe in words how you will set up and complete the Punnett squares.
3. Carry out your plan and decide which baby belongs to each set of parents.

◆ Analyze and Conclude

Answer the following questions on a separate sheet of paper.

1. What are the possible genotypes of Mr. and Mrs. Iben?
2. What are the possible genotypes of children born to Mr. and Mrs. Iben?
3. What are the possible genotypes of Mr. and Mrs. Iten?
4. What are the possible genotypes of children born to Mr. and Mrs. Iten?
5. Which baby, baby 1 or baby 2, belongs to Mr. and Mrs. Iben? Which baby belongs to Mr. and Mrs. Iten? Explain.