

Mystery in Wexford

Objectives:

1. Create Joseph and Rita's family pedigree and include all the correct blood types, traits, and relationships.
2. Analyze Joseph and Rita's family genotypes from the pedigree and solve the family mystery.

Scenario:

Joseph and his wife Rita, owners of a home in Wexford, are a wealthy elderly couple. Joseph died recently of a sudden death when he was struck by lightning in his metal johnboat while fishing for red fish in the Port Royal Sound. His body was never recovered. All of Joseph's children and grandchildren (who happened to be at the house at the time for a Father's Day celebration,) eagerly awaited the reading of Joseph's will, since they all knew that he would provide each of his blood relatives with an equal share of his wealth.

When the lawyer arrived to read the will, he noticed that a sum of money was missing from the safe in Joseph's office. The sum missing was equal to one person's portion of the estate value. In addition, a small amount of fresh blood was found on the outside of the safe door, presumably belonging to the thief whose hand most likely got caught on the sharp edges of the safe. As the lawyer was announcing this news, the maid rushed into the room and revealed that she had walked into Joseph's office to do her regular dusting and observed the thief quickly slipping out of the patio doors and running away down the beach. She had not seen the face or been able to identify the thief, since he or she wore a mask and a bulky overcoat. She did see, however, that the thief had attached ear lobes sticking out from behind the mask.

The police were called to the home. Upon arrival, they immediately ordered blood typing tests on all individuals in the house, and on the blood smear on the safe (found to be type A-). They also noted the ear lobe type of everyone present.

Your task:

As chief investigators of the South Carolina law enforcement division, it is your job to analyze the data to determine who stole the money and what their motive may have been.

Where to begin:

1. Draw this family's pedigree to help you discover who is guilty (on the blank sheet you picked up).
 - a. Make sure it is neat. Each generation should be marked with roman numerals on the left of your tree and all individuals of that generation should be on the same horizontal level (use a ruler!). Do a rough draft in pencil below the data table **FIRST!**
 - b. Write the names of each family member on the shapes.
 - c. Write the blood types of each family member above the shapes. (Phenotypes, not genotypes).
 - d. Shade in every person who has an attached earlobe. Then, use what you know about determining inheritance patterns in a pedigree to determine the inheritance pattern of attached earlobes, and write in all genotypes for this trait under each shape. If the genotype is unknown for the second allele in dominant phenotypes, write both options.
 - e. Determine the genotypes for blood type of Joseph and his family members. Write these in a different color next to each blood type phenotype. Since you don't know Joseph's genotype, you will need to work backwards. This may take a little trial and error, so be patient! Start by writing in the genotypes you know must be true. (**Hint:** If someone has blood type AB, you know their genotype is AB ☺)
 - f. List the suspects, off to the side, based on the two pieces of evidence collected. Then determine who the thief was based on the information you gathered. Think about motive. The person who stole the money may not have stolen it for themselves.
2. Answer the analysis questions. Include reasoning to support/defend all of your answers!!

Data Table:

<i>Name</i>	<i>Blood Type</i>	<i>Ear Lobe</i>	<i>Relation</i>
Joseph	N/A	Free	Married to Rita
Rita	AB-	Free	Married to Joseph
Jane	O-	Free	Married to Howard
Howard	AB-	Attached	Son of Joseph and Rita
Claire	A+	Free	Daughter of Joseph and Rita
Paul	B+	Free	Married to Claire
Joey	B+	Free	Son of Joseph and Rita
Danny	A-	Attached	Son of Joseph and Rita
Robyn	AB-	Free	Married to Danny
Julie	A-	Attached	Daughter of Jane and Howard
Brian	B-	Free	Son of Jane and Howard
Adam	B-	Free	Son of Jane and Howard
Justin	O-	Free	Son of Claire and Paul
Shayna	A-	Attached	Daughter of Claire and Paul
Jeremy	AB-	Free	Son of Danny and Robyn
Alexandria	A+	Free	Daughter of Danny and Robyn
Amelia	B-	Attached	Daughter of Danny and Robyn

Pedigree Rough Draft:

Analysis Questions:

Use the back of this sheet if you need more room for your answers.

1. Explain the inheritance pattern of the ear lobe attachment trait. Explain how you determined this.

2. Explain the two inheritance patterns of blood type.

3. What did you determine Joseph's blood type to be? Include genotype and phenotype. Explain how you determined this, including Punnett Squares to support your reasoning.

4. Who was the thief of the money? How did you determine this? Include what the thief's potential motive may have been for stealing the money.

5. How are pedigrees a useful tool for understanding inheritance patterns? Think of at least three ways they are beneficial.
