

Blood Types - Multiple Alleles and Codominance

- In humans, there are four blood types (phenotypes): A, B, AB, and O
- Blood type is controlled by three alleles A, B, O found on chromosome 9
- O is recessive, two O alleles must be present for the person to have type O blood
- A and B are **codominant**. If a person receives an A allele and a B allele, their blood type is type AB
- Crosses involving blood type often use an *I* to denote the alleles - see chart.

Blood Type	Genotype		Can Receive Blood From:
A	$I^A I^A$ $I^A i$	AA AO	A or O
B	$I^B I^B$ $I^B i$	BB BO	B or O
AB	$I^A I^B$	AB	A, B, AB, or O
O	ii	OO	O

When doing blood type crosses, you will need to know whether a type A or B person is heterozygous or homozygous. Type O's are automatically OO and type AB is automatically AB. Crosses are performed the same as any other using a Punnett square.

1. Write the genotype for each person based on the description:

- Homozygous for the "B" allele _____
- Heterozygous for the "A" allele _____
- Type O _____
- Type "A" and had a type "O" parent _____
- Type "AB" _____
- Blood can be donated to anybody _____

2. Gene Poole is married to Molly Kuehl and they have decided to have a baby. Gene is heterozygous type "B" and Molly is type "O" blood. What are all the possible blood types of their future children? Write the genotype and phenotype percentages.

Genotype:

Phenotype:

3. Candy Barr is married to Artie Choke. Candy Barr has type "O" blood and Artie Choke has type AB blood. Draw a Punnett square showing all the possible blood types for the offspring produced by the couple. Write the genotype and phenotype percentages.

Genotype:

Phenotype:

4. Mrs. Clink is type "A" and Mr. Clink is type "O." They have two biological children named Mark and Fred. Mark is type "O," Fred is type "A," They have a third child named Karen. Her blood type is "AB". Draw the Punnett Square for Mr. and Mrs. Clink.

Based on this information:

- a. Mr. Clink must have the genotype _____
b. Mrs. Clink must have the genotype _____
because _____ has blood type _____
c. Is Karen the biological child of Mr. and Mrs. Clink? Yes or No
Explain your answer _____

5. Mr. and Mrs. Butter think their baby (Peanut) was switched at the hospital. Its 1968, so DNA fingerprinting technology does not exist yet. The mother has blood type "O," the father has blood type "AB" and the baby has blood type "B."

- a. Mother's genotype: _____
b. Father's genotype: _____
c. Baby's genotype: _____ or _____
d. Was Peanut Butter switched as a baby? Yes or No
How do you know? _____

6. Two parents think their baby was switched at the hospital. Priscilla, the mother, has blood type "A," Elvis, the father has blood type "B," and Lisa Marie, the baby, has blood type "AB."

- a. Mother's genotype: _____ or _____
b. Father's genotype: _____ or _____
c. Baby's genotype: _____
d. Punnett square that shows the baby's genotype as a possibility
e. Could the baby actually be theirs? _____