

## Blood Types, Codominant traits, and incomplete Dominance Notes

### Blood Types information:

Some traits are controlled by multiple alleles. Multiple alleles occur when you have more than 2 alleles for a trait. This will result in more than two choices of a trait. An example of this type of inheritance in humans is blood types.

Humans have three alleles for blood types which results in four types of blood. The three alleles are A, B, and O. The A and B alleles are codominant with each other and are both dominant over the O allele. These can combine to form four types of blood – A, B, AB, and O.

Blood type	Possible Allele Combination

### Predicting Blood Types:

If you know the blood types of the parents, you can make predictions as to what their children's blood types will be using a Punnett square.

### Examples:

Mom has blood type AB and Dad has blood type O. What are the possible blood types for their child?


Possible genotypes:

Possible phenotypes:

Mom has blood type B with an allele combination of BO. Dad has blood type A with an allele combination of AO. What are the possible blood types for their child?


Possible genotypes:

Possible phenotypes:

### Codominant Traits and Punnett Squares:

A codominant trait occurs when two alleles are **neither dominant nor recessive to the other**. These traits will always use two different capital letters and **both of the alleles will show up in the offspring**.

**Example** – Chicken feather color in one breed of chickens is a codominant trait. If you cross a black feathered chicken with a white feathered chicken, what color will the baby chick's feathers be?


Possible genotypes:

Possible phenotypes:

### Incomplete dominance traits and Punnett Squares:

When you have a trait with incomplete dominance, **one allele is not completely dominant over another**. Because there is not one truly dominant allele, you get a **blending of the two alleles**. This blending will result in a third, new trait that is a blend of the two parents. We see this type of inheritance a lot in flowers.

### Examples:

Petal color in roses is an example of incomplete dominance. If we cross a rose plant with red petals and a rose plant with white petals, what color will the new plant's petals be?


Possible genotypes:

Possible phenotypes:

If we cross a rose with pink petals (RW) and a rose with white petals (WW), what are the possible outcomes?


Possible genotypes:

Possible phenotypes:

### Blood Types, Codominant traits, and Incomplete Dominance Practice

1. In humans, wavy hair (CS) is a result of codominant traits with curly hair (C) & straight hair (S). What are the possible results if a curly-haired man and wavy-haired woman have children?
2. In crocus flowers, white (W) and purple (P) colors are co-dominant and result in a purple and white striped flower when both genes are present. What are the possible results when you cross a striped crocus with a white crocus?
3. In cattle, red (r) is incompletely dominant over white (w) fur. Roan is the name of the color that results from incomplete dominance which is a blend of the two. What are the possible results if a white male mates with a roan female?
4. A cross between a blue blahblah bird & a white blahblah bird produces offspring that are silver. What colors would the offspring of two silver blahblah birds be?
5. A man with Type A blood marries a woman with type B blood. Is it possible for them to have a child with blood type O? Draw the punnett square to prove your answer.
6. What are the possible blood types of a child whose parents are both heterozygous for B blood type?

### Codominance Practice Problems

1. Mom has type A blood. Dad has type AB blood. What possible blood types could their children inherit? (Show all possibilities).
2. Mom has type O blood. Dad has type AB blood. What percentage of their kids will inherit type B blood?
3. Mom has type B blood. Dad has type O blood. They have a child with type O blood. Make a punnett square to show what Mom's genotype must be to have a child with type O blood.
4. The woman is type A, the child is type O, and the man is type AB. Could he be the dad? Show why or why not.
5. There is a couple who have blood types AB and O. A man with blood type O claims to be their long lost son. Show why he can or cannot be their son.
6. John has type O blood. He knows his mother had type B blood. He does not know the identity of his father. What possible blood types could his father have had? Show your work.
7. Mike has type AB blood. Paul has type O blood. Mike knows that his Mom had type B blood. Show how it could be possible for Mike and Paul to be brothers.
8. You can use the same notation we see in blood type for other codominant traits as well. In cows, the red and white coat color alleles are codominant. A cow with RW has the color called roan which is red and white spots.  
( how a cross between a white cow (WW) and a red cow (RR)