

## Complex Inheritance - Incomplete Dominance and Codominance

1. Many genetic traits have a stronger dominant allele and a weaker recessive allele. This is known as complete dominance. What is a trait, however, is NOT completely dominant and/or recessive.

**Summarize the difference between incomplete dominance and codominance.**

2. In some chickens, the heterozygous genotype leads to a phenotype known as **erminette**, feathers which are speckled with both black AND white. The allele for Black is B and the allele for white is W.

a. This is an example of which inheritance pattern (*incomplete dominance or codominance*)?

b. For each *phenotype* below, identify the *genotype*.

**Black Chickens** \_\_\_\_\_     
 **White Chickens** \_\_\_\_\_     
 **Erminette Chickens** \_\_\_\_\_

3. A black chicken is crossed with a white chicken.

a. Give the expected **probabilities** for each genotype and phenotype.


b. Give the expected **ratios** for the genotypes and phenotypes.


4. Two erminette chickens are crossed.

a. Give the expected **probabilities** for each genotype and phenotype.

b. Give the expected **ratios** for the genotypes and phenotypes.

5. In snapdragons, flower color is controlled by **incomplete dominance**. The allele for red is R and the allele for white is W.

a. Knowing this trait is incompletely dominant, what would be the **phenotype** for the heterozygous condition ( RW )? \_\_\_\_\_

b. For each *phenotype* below, identify the *genotype*.

**Red Genotype:** \_\_\_\_\_      **White Genotype:** \_\_\_\_\_



6. A pink flowered snapdragon is crossed with a white flowered snapdragon.

a. Give the expected **probabilities** for each genotype and phenotype.


b. Give the expected **ratios** for the genotypes and phenotypes.


7. Edward is extremely romantic and wants to give Bella an entire bouquet of pink snapdragons, her favorite flower. Unfortunately, Edward only has red snapdragons in his greenhouse. In order to produce *the most number of pink snapdragons*, what color flower should Edward cross with his red snapdragons? Show the punnett square to defend your answer.

a. This cross should produce \_\_\_\_\_% **pink** snapdragons.

8. What would be Edward's **second choice** in order to produce pink snapdragons. Show the punnett square to defend your answer.

a. This cross should produce \_\_\_\_\_% **pink** snapdragons.


9. Hair color in certain breeds of horses can be Brown (B), White (W) or Palomino (*a tan color resulting from the heterozygous genotype BW*). Show the cross between a brown horse and a palomino horse.

a. This is an example of which **inheritance pattern**?


b. Give the expected genotype & phenotype **probabilities**.

c. Give the expected genotype and phenotype **ratios**.

10. Can palominos be considered a **purebred** line of horses? *Explain your answer.*

11. Palomino horses are worth a great deal of money. Which color horses would you breed if you wanted to produce *the most number of palominos in the shortest amount of time*? Show the punnett square to defend your answer.


## Blood Type Codominance Practice Problems

Human blood types are determined by genes that follow the CODOMINANCE pattern of inheritance. There are two equally dominant alleles (A and B) and one recessive allele (O).

12. Fill in the following chart with the missing information.

Blood Type (Phenotype)	Possible Genotype(s)	Can donate blood to:	Can receive blood from:
<b>O</b>		("universal donor")	O
<b>AB</b>		AB	("universal recipient")
<b>A</b>			O , A
<b>B</b>		AB , B	

13. Write the **genotype** for each person, based on the given description.

Homozygous for Type B Blood \_\_\_\_\_

Heterozygous for Type A Blood \_\_\_\_\_

Type O Blood \_\_\_\_\_

Type A Blood and had a parent with Type O Blood \_\_\_\_\_

Type AB Blood \_\_\_\_\_

Blood can be given to any individual \_\_\_\_\_

Heterozygous for Type B Blood \_\_\_\_\_

Homozygous for Type A Blood \_\_\_\_\_

Can only receive blood from a Type O donor \_\_\_\_\_

14. A father is heterozygous for his type B blood (BO) and the mother has type O blood.

a. What are the **possible blood types** of the babies born from this couple?


15. A father has type AB blood and the mother has type O blood.

a. What percentage of their offspring would you expect to have...


**Type A Blood** \_\_\_\_\_%

**Type B Blood** \_\_\_\_\_%

**Type AB Blood** \_\_\_\_\_%

**Type O Blood** \_\_\_\_\_%

16. A father is heterozygous for his type A blood and a mother is heterozygous for her type B blood.

a. What percentage of their offspring would you expect to have...

Type A Blood \_\_\_\_\_%

Type B Blood \_\_\_\_\_%

Type AB Blood \_\_\_\_\_%

Type O Blood \_\_\_\_\_%


17. Mrs. Weasley has Type A blood but she is not sure if she is homozygous or heterozygous. Mr. Weasley is completely unsure of his blood type. Their children have the following blood types: Ron has Type O blood, Fred & George have type A blood, Ginny has type B blood and Percy has type AB blood. Show the cross to answer the following questions.

a. What is Mrs. Weasley's genotype? \_\_\_\_\_

b. What is Mr. Weasley's genotype? \_\_\_\_\_



18. In 1968, a couple accused a hospital of switching their baby with another. DNA fingerprinting did not exist at this time so the hospital traced the blood types of the family in order to determine if a mistake was made. The mother had type A blood, the father had type AB blood, and the baby had type O blood. Use the punnett square to defend your answer to the following question.

a. Did the hospital make a mistake and switch the baby? \_\_\_\_\_

19. On a recent episode of Jerry Springer, a man accused his wife of cheating on him. The man has type AB blood, the woman has type O blood and yet the baby has type B blood. Use the punnett square in order to determine if this man could possibly be the father of this child.

a. Could this man be the father of this child? \_\_\_\_\_


b. In the chart below, **circle the other possible options** for the father for this baby.

Name	Blood Type
The mailman	Type O
The butcher	Type AB
The waiter	Type A
The cable guy	Type B