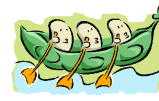
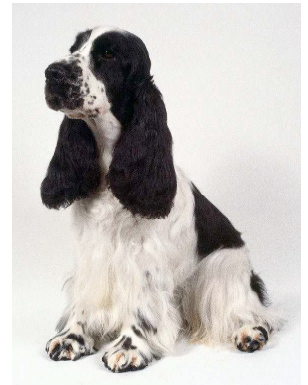




Genetics Problem Set # 3: *Dihybrid Crosses & Exceptions*



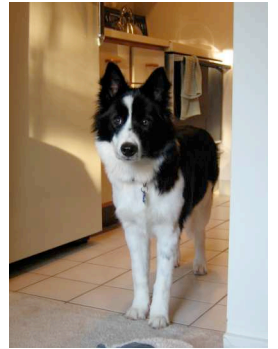
1. Black coat color in Cocker Spaniels is dominant, while red coat color is recessive; solid pattern is dominant, while spotted pattern is recessive. A homozygous solid and heterozygous black male is mated to a spotted, red female and produces a litter of pups.



- Identify the variables needed for the Punnett square:
 - Gametes of Parent #1:
 - Gametes of Parent #2:

- What are the possible phenotypes?
- Phenotypic ratios:
- What are the possible genotypes?
- Genotypic Ratio
- What percentage of the offspring could be black with spotted coats? _____

2. Border Collies have white fur with markings. These markings can be black or brown. Black is dominant to brown. Fur length can vary too. Short hair is dominant to long hair. You cross a homozygous short-haired and heterozygous black Border Collie with a homozygous long-haired brown collie.



- Identify the variables needed for the Punnett square:
 - Gametes of Parent #1:
 - Gametes of Parent #2:

- What are the possible phenotypes?
- Phenotypic ratios:
- What are the possible genotypes?
- Genotypic Ratio
- What percentage of the offspring could be black with long hair? _____

3. In pea plants, tall is dominant over short and purple flowers are dominant over white flowers. You mate a heterozygous tall and pure purple flowering pea plant with a short, heterozygous purple flowering pea plant. Use a Punnet square to calculate all possible offspring. Tell me the phenotype of all the offspring, and the probability that they would appear.

4. In a species of small fish, blue scales is dominant to white scales and forked tails are dominant to straight tails. What are the phenotypes and probabilities of possible offspring from a mating between a hybrid blue scaled, straight tailed fish and heterozygous blue scaled, heterozygous forked tailed fish.

5. In sheep, curved horns are dominant to straight horns, and black wool is dominant to white wool. After two dihybrids mate, what percentage of the offspring would you expect to have curved horns and white wool?

6. In humans, brown eyes are dominant to blue eyes and hair type can be curly, wavy, or straight. If a man who is homozygous recessive for eye color and has wavy hair mates with a woman who is heterozygous for eye color and has straight hair. What fraction of the offspring would you expect to be:

Brown eyes with wavy hair? _____

Blue eyes with straight hair? _____

7. You cross a true-breeding tall, red Japanese 5 o'clock flowering plant with a true-breeding short, white Japanese 5 o'clock flowering plant. All of the F_1 offspring have pink flowers and are tall. If F_1 offspring cross to have 46 F_2 offspring, how many of them would you expect to have white flowers and be short?

8. Having freckles is dominant to not having freckles. If a man (whose father had blood type O and no freckles) has freckles and blood type A, marries a woman with type AB and no freckles. What is the chance that their child will have freckles and have blood type B?

9. Suppose two newborn babies were accidentally mixed up in the hospital. In an effort to determine the parents of each baby, the blood types of the babies and parents were determined.

Baby 1- type O

Baby 2- type A

Mrs. Brown- type B

Mrs. Smith- type B

Mr. Brown- type AB

Mr. Smith- type B

- a. Which set of parents does Baby 1 belong to?
- b. Draw two Punnett squares to justify your response.

10. Hair shape shows incomplete dominance. The possible hair shapes are curly, wavy, and straight.

Michael is a wavy haired man with type O blood. His wife, Tara, who also has wavy hair, gives birth to fraternal (two eggs, non-identical) twins, Sophia and Max. Both offspring have straight hair. Sophia has type A blood and Max has type B Blood.

- a. What is Michael's genotype?
- b. What is his wife's genotype? What is her phenotype?
- c. What are the genotypes of each of the twins?