

Name: _____

Genetic Problems – CO-DOMINANCE & INCOMPLETE DOMINANCE

For each of the following problems:

- a. make a key
- b. write out the cross
- c. make a Punnett square
- d. answer the associated questions

YOU MUST DO THIS FOR EVERY CROSS IN EACH QUESTION!

1. Sickle cell anemia is a co-dominant disorder, where A stands for normal red blood cells and S stands for sickle-shaped red blood cells. Heterozygous individuals have a phenotype showing both sickle-celled and normal-shaped red blood cells. Cross two people who are heterozygous for this trait.

- a. What is the probability their offspring are likely to have sickle cell anemia?
- b. What is the probability their offspring will have both normal and sickle cell-shaped red blood cells?
- c. What is the probability their offspring will be able to pass along the sickle trait to their children?

2. Co-dominance is observed in tabby cats. A cross between a black cat and a tan cat produces a tabby pattern (black and tan fur together).

- a. Cross a black cat with a tabby cat. What are the phenotypes and genotype ratios of the offspring?
- b. Is it possible to get a black cat if the parent generation is a tan cat crossed with a tabby cat? If you answered "yes", go to "c"; if you answered "no" skip "c".
- c. If your answer is "yes", how many generations would it take to get a black cat?
- d. Cross two tabby cats. What are the genotype and phenotype ratios of the offspring?

3. In some cattle, the allele for Brown hair (B) and the allele for white hair (W) are incomplete-dominance. The heterozygous condition results in red cattle, called roan.

- a. Cross a red cow with a white bull. What is the genotype and phenotype ratio of the offspring?
- b. Cross a roan bull with a roan cow. What is the genotype and phenotype ratio of the offspring?
- c. Cross a red cow with a roan bull. What is the genotype and phenotype ratio of the offspring?
- d. Cross a roan cow with a white bull. What is the genotype and phenotype ratio of the offspring?

4. In Labradors, the allele for Black hair (B) and the allele for yellow hair (Y) are incomplete-dominance. The heterozygous condition results in a brown Labrador. Use a Punnett square to prove your answers.

- a. If an entire litter of puppies is brown and the mother is yellow, what color was the father likely to be?
- b. If 75% of the puppies were brown and 25% were yellow, what was the likely genotype of each parent?
- c. What must the parents be to have an entire litter of black puppies? Yellow puppies?