Name: _____ **Date: _____**

Genetics Student Pre- or Posttest (Answer Key)

1. **Kittens**
   You have a female cat with a long tail. Your friend Mia has a male cat that was born with an unusual "bobbed" tail that's very short and looks more like a rabbit tail than a cat tail. Your two cats got together and had six kittens. Two of the kittens have long tails, and four have bobbed tails.

   Why do some of the kittens have long tails and others have bobbed tails? Make sure your explanation is as specific as possible.

Photo courtesy of Pixabay.com

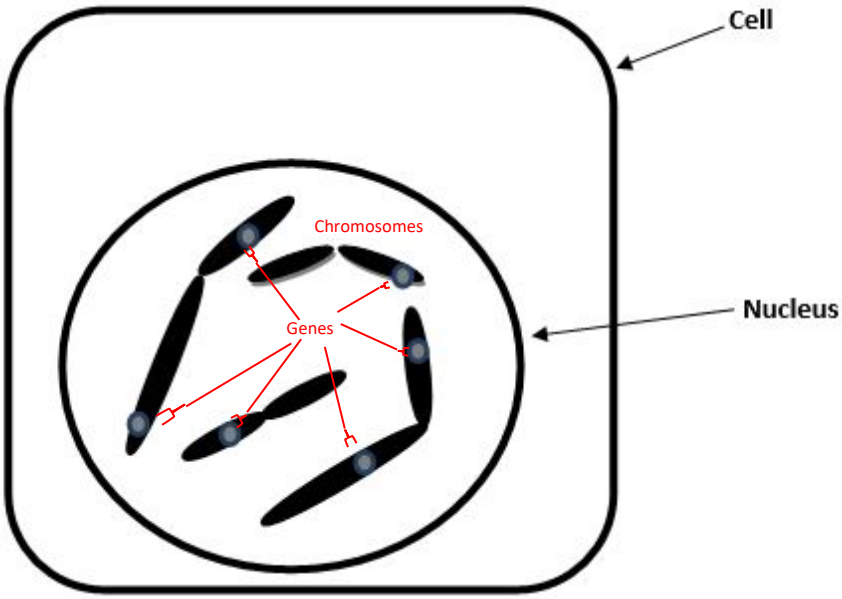
Photo courtesy of Chris 73/ Wikimedia Commons

Ideal response:

Having a long or bobbed tail is probably an inherited trait. The kittens all had a similar environment, but some were born with long tails, and others had bobbed tails. This means the offspring inherited different combinations of genes for tails traits. Kittens with one kind of allele for a gene might inherit a bobbed tail, and kittens with a different allele for the same gene might have a long tail. If the allele for a long tail is dominant, the kittens with long tails would get one dominant long-tail allele from your cat and one recessive bobbed-tail allele from Mia's cat, and the bobbed-tail kittens would inherit a bobbed-tail allele from both parents. If the allele for a long tail is recessive, the kittens with long tails would inherit a recessive long-tail allele from both parents, and the kittens with bobbed tails would inherit one recessive long-tail allele from your cat and one dominant bobbed-tail allele from Mia's cat.

2. **Chromosomes and Genes**

The diagram below shows a cell with a nucleus.



a. Label the following on the diagram:
   - Chromosomes
   - Genes

b. What do genes and chromosomes have to do with what an individual looks like?

Ideal response:

Genes determine your inherited traits. They're found on chromosomes.

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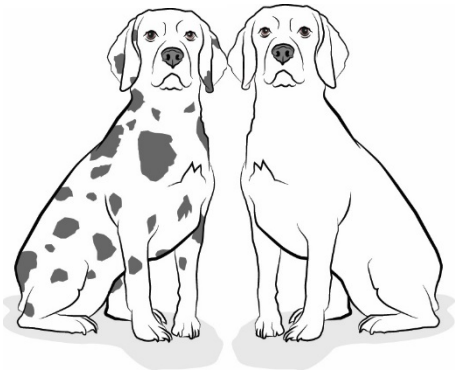
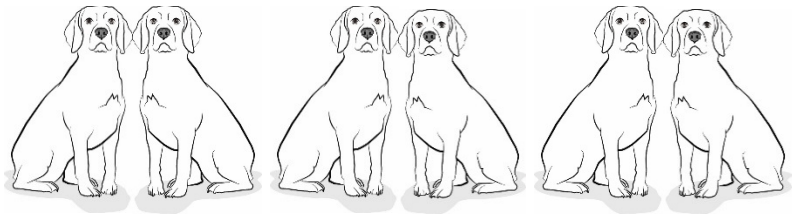
3. **Spotted and Solid-Colored Dogs**

a. A spotted dog is bred with a solid-colored dog:



All of their puppies are solid colored:



Provide one explanation for why all of the puppies are solid colored.

Ideal response:

All of the puppies are solid colored (without spots) because each puppy has two different alleles. Each inherited an allele for spotted fur from one parent and an allele for solid-colored fur from the other parent. The solid-colored fur trait must be dominant because a dominant trait shows up if an individual inherits two different alleles from the parents.

b. After the puppies grow up, one of them is bred with another solid-colored dog. This dog also had one parent with spotted fur and one with solid-colored fur. What would you expect their puppies to look like?

Ideal response:

I'd expect some of the puppies to have spotted fur and some to have solid-colored fur. Since solid-colored fur is the dominant trait, I'd expect more of the puppies to have solid-colored fur and fewer to have spotted fur (a ratio of about 3:1).

c. Explain your response for part b.

Ideal response:

Puppies with spotted fur will show up in the second generation, even though neither parent has spotted fur, because each puppy inherits one allele from each parent, and each parent has one spotted allele and one solid-color allele. Which of the parents' alleles the puppies inherit is random, so they might get the same allele from each parent or a different allele from each parent. If a puppy inherits two spotted alleles, it will be spotted. If it inherits two solid-color alleles or a spotted allele and a solid-color allele, the puppy will be solid colored.