

# Artificial Selection

Lab Activity – Student Edition

## Breeding Dogs

### Background Information:

We know that all animals have adaptations that help them survive in their specific environment. In the case of Charles Darwin's research on the finches in Galapagos, these birds have evolved different beaks to be able to obtain available food. Other species adapt to survive in the wild. This is called natural selection.

However, throughout history, humans have domesticated both plants and animals, using crossbreeding to select for desirable traits, like bigger fruit, more milk production, or in the case of dogs, maybe just better companionship.

There is only one species of dog, but over 400 different breeds. Since all dogs are in that single species, the breeds can be crossbred to produce puppies with different traits. The process for this is to decide what traits are desired, find dogs with those traits, and then mating them for a few generations until puppies with those traits. In this case, a new breed has been developed by artificial selection or selective breeding.

### Materials: per partner pair

a penny

### Prelab Questions

1. Discuss with your partner what you know about dog breeds. List for each other as many as you can. Did you list 400?
  
2. Of the breeds you know, what traits can you think of? Can you think of how those traits might be considered helpful or desirable to humans?

### Procedure-

Follow the direction on the next pages.

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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Breeders' names: \_\_\_\_\_ Date: \_\_\_\_\_

**Assignment:** You are a dog breeder. You have been contacted by a scientist working in the arctic. The scientist wants a dog that will be able to hear a polar bear approaching and alert him with a loud bark. This could also help to scare the polar bear away.

## Part I: Desired features of the new breed

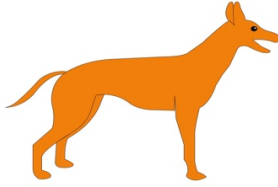
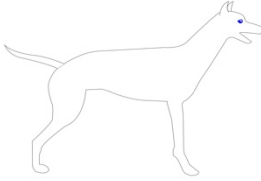

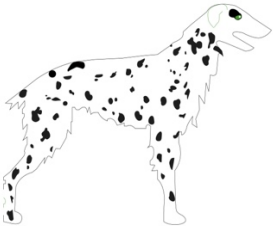


For each feature below, circle the desired form you ideally **want** your dogs to have. For features that you do **not think** will affect your breed's ability to perform the given task, circle "any."

Physical feature	Desired Trait			
Coat color	dark	medium	white	Any
Fur length	short	medium	long	Any
Ears	pointy	rounded	floppy	Any
Sight	keen	medium	poor	Any
Smell	keen	medium	poor	Any
Endurance	hardy	medium	weak	Any
Behavioral feature	Desired Trait			
Trainability	high	medium	low	Any
Bark	soft	medium	loud	Any
Disposition	friendly	medium	vicious	Any

For each feature that you selected, explain **WHY** that trait would be helpful to the arctic scientist.

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Here are the choices of dog breeds you may select from. Remember that no one breed has all the traits you are looking for, so you need to select two breeds. While you look at the breeds, **put a check by each desirable trait** the breed possesses. This could help you select the breeds you wish to work with.

 <p style="text-align: center;"><b>Breed A</b></p> <p> <b>Medium coat</b>  <b>Short fur</b>  <b>Pointy ears</b>  <b>Medium sight</b>  <b>Keen smell</b>  <b>Poor endurance</b>  <b>Medium trainability</b>  <b>Friendly</b>  <b>Soft bark</b> </p>	 <p style="text-align: center;"><b>Breed B</b></p> <p> <b>White coat</b>  <b>Short fur</b>  <b>Pointy ears</b>  <b>Medium sight</b>  <b>Medium smell</b>  <b>Hardy</b>  <b>High trainability</b>  <b>Vicious</b>  <b>Loud bark</b> </p>	 <p style="text-align: center;"><b>Breed C</b></p> <p> <b>Dark coat</b>  <b>Long fur</b>  <b>Floppy ears</b>  <b>Keen sight</b>  <b>Keen smell</b>  <b>Hardy</b>  <b>High trainability</b>  <b>Friendly</b>  <b>Loud bark</b> </p>
 <p style="text-align: center;"><b>Breed D</b></p> <p> <b>White coat</b>  <b>Long fur</b>  <b>Floppy ears</b>  <b>Medium sight</b>  <b>Medium smell</b>  <b>Hardy</b>  <b>Low trainability</b>  <b>Medium disposition</b>  <b>Medium bark</b> </p>	 <p style="text-align: center;"><b>Breed E</b></p> <p> <b>Dark coat</b>  <b>Long fur</b>  <b>Pointy ears</b>  <b>Poor sight</b>  <b>Medium smell</b>  <b>Weak</b>  <b>Medium trainability</b>  <b>Friendly disposition</b>  <b>Loud bark</b> </p>	 <p style="text-align: center;"><b>Breed D</b></p> <p> <b>Medium coat</b>  <b>Medium fur</b>  <b>Pointy ears</b>  <b>Medium sight</b>  <b>Keen smell</b>  <b>Medium endurance</b>  <b>Low trainability</b>  <b>Vicious disposition</b>  <b>Medium bark</b> </p>

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**Part II:** Dog breeds chosen to mate: \_\_\_\_\_ X \_\_\_\_\_

Reason:

Which two traits do you think are most important for your new breed to inherit?

**Part III:** Now you will “breed” the male and female dogs. Remember our study of genetics and how the offspring receives one gene from each parent randomly.

We will use a penny flip to select whether a puppy will have the trait from the mother or from the father dog. There will be three puppies, so we will repeat the “breeding” three times.

On the column “trait from mother” and “trait from father”, write the trait of the breed you selected to mate.

For each trait, flip a coin. If the coin falls on “heads”, the puppy will inherit the mother’s traits. If the coin falls on “tails”, the puppy will inherit the father’s traits. Write that trait in the column “Puppy #1”. Continue flipping the coin to select the traits for Puppy #1.

Repeat the process for Puppy #2 and Puppy #3.

Trait	Trait from mother	Trait from father	Puppy #1	Puppy #2	Puppy #3
Coat color					
Fur length					
Ears					
Sight					
Smell					
Endurance					
Trainability					
Bark					
Disposition					

Name: \_\_\_\_\_ Period: \_\_\_\_\_ Date: \_\_\_\_\_

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Do any of these puppies have all the traits you originally wanted for the task in the Arctic? Are any of them closer to the goal than either of the parents?

In selective breeding, you may not get the exact traits in one generation. Breeders will then mate them again to acquire those traits. When the “perfect” dog is born, that dog should be bred with its own kind.

**Part IV:** Draw the puppy that has the closest traits for your goal. What would be the next step for the arctic scientist?