Investigating Coat Color Inheritance and Hairless Breeds: Statistics and Probability

Name _____

Boxers are a popular dog breed which can have a striping pattern known as "Brindle" on their underlying base color. Double brindle (BB) and single brindle (Bb) Boxers appear the same (phenotype). Boxer coats without brindle are known as "Fawn" and can range from tan to mahogany ("deer-red"). Below, you will be asked about offspring coat color probabilities given different sets of purebred boxer parents.

Boxer Coat Genotypes	Phenotypic Result
BB	Brindle (striping)
Bb	Brindle (striping)
bb	Fawn

HELPFUL REMINDERS

-Most traits have 2 genes, one received from each parent. Different combinations of those genes can yield different looks (phenotypes) in the offspring.

-Punnett Squares are used to help predict probabilities of certain traits of offspring.

-Capitalized letters are considered dominant genes and mask recessive genes (represented with lower case letters).

1) What are the odds of 2 Double brindle boxers having a litter that includes a Fawn puppy? (Prove answer by using Punnett Sq.)

_____%

2) If 2 Fawn boxers are bred, what percent of the litter would also be Fawn? (Prove answer by using Punnett Sq.)

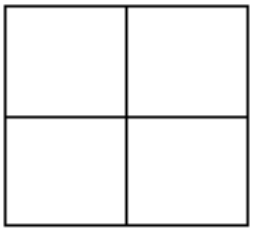
_____%

3) If a double brindle boxer is bred with a single brindle boxer, what percent of the litter would be Fawn?; Would have brindle? (Prove answer by using Punnett Sq.)

Fawn: _____% Brindle _____%

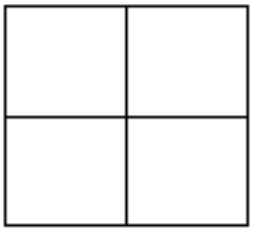
4) What percent of the litter would be Fawn if a Fawn boxer were bred with double brindle boxer? (Prove answer by using Punnett Sq.)

_____% Fawn



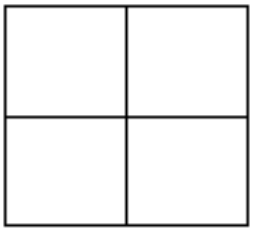
5 What percent of the litter would be Fawn if a Fawn boxer were bred with a single brindle boxer? (Prove answer by using Punnett Sq.)

_____% Fawn



6) What percent of the litter would have brindle if 2 single brindle boxers were bred together? (Prove answer by using Punnett Sq.)

_____% with brindle



7) A Fawn boxer named Rex was bred with Casey, a boxer with brindle. Of all the puppies in the litter, only 1 had a fawn coat. Is Casey a Double or Single Brindle Boxer? How do you know?

American Hairless Terrier

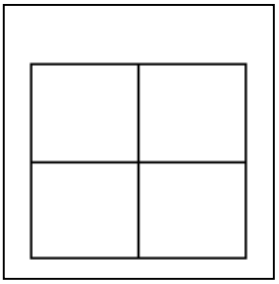
Similar to the hairless cat, commonly known as a Sphynx, there are some hairless dog breeds as well. Xoloitzcuintli ("Xolo" - "Mexican Hairless"), the "Chinese Crested", and the Peruvian Inca Orchid (PIO) are 3 breeds who are commonly known for hairlessness. Each of these 3 breeds contains the *dominant* Alopecia gene which causes hairlessness. Unlike those breeds, the gene for hairlessness in **American Hairless Terriers (AHTs)** is *recessive*.

Using the information below, complete questions 8-9.

American Hairless Terrier Genes for Hair	Phenotypic Result
HH	Coated
Hh	Coated, but a carrier
hh	Hairless

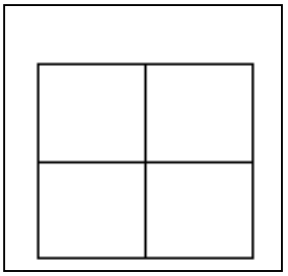
8) What are the odds of 2 coated AHT parents having a litter that contains a hairless AHT puppy? (Prove answer by using Punnett Square to the right)

_____%



9) What are the odds of 2 coated carrier AHT parents producing a hairless AHT puppy? (Prove answer by using Punnett Square to the right)

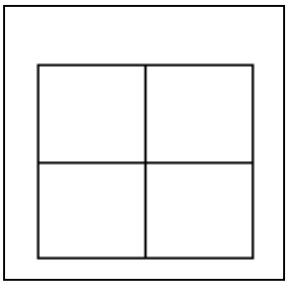
_____%



10) If a hairless AHT is bred with a coated carrier AHT, what are the odds of producing (Prove answer by using Punnett Square to the right)

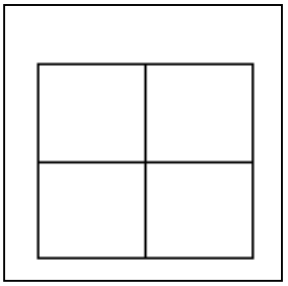
Hairless puppies: _____%

Coated puppies : _____%



11) What are the odds of 2 hairless AHT parents producing puppies with hair (coated)? (Prove answer by using Punnett Square to the right)

_____%



Litter Application – Use your work and answer to #11, complete Table 1 below.

12. Assume that two hairless American Hairless Terrier parents are bred until there are 12 total puppies. Remember, coated dogs of this breed have at least 1 dominant gene for hair (hairlessness is recessive). Complete the offspring percentage and number out of 11 in Table 1 to the right that would be hairless or coated. (See #11)

TABLE 1

		American Hairless Terriers	
		%	# of 12
Hairless	hh		
Coated	HH or Hh		