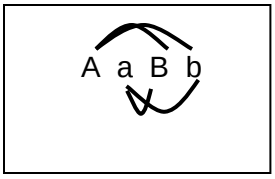
Mendelian Inheritance: Dihybrid Crosses

PURPOSE: To predict and compare the genetic variations that will result from a genetic cross involving two traits at a time

A dihybrid cross involves inheritance patterns for organisms differing in two traits. The dihybrid cross was invented by Mendel to determine if different traits of pea plants were inherited independently or as a unit. The discovery that round peas could be yellow or green led to Mendel's Law of Independent Assortment which states that the inheritance of one trait does not influence the inheritance of a second trait.

In dihybrid crosses, an individual will have two traits included in their genotype, for a total of 4 letters. To solve a dihybrid Punnett Square, you first must determine what allele combinations can be passed on to future offspring. To do this, look at the parent genotype and complete FOIL (first, outer, inner, last).

Parent genotype: AaBb



Possible Gametes: AB, Ab, aB, ab

Practice finding the possible gamete combinations below.

1. List the possible gametes from

Ddmm

_____, _____, _____, _____

2. List the possible gametes from

DdMM

_____, _____, _____, _____

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3. In Cyclops, one eye (E) is dominant to two eyes (e) and curly hair (H) is dominant to straight hair (h).

a. List the possible gametes from the homozygous one-eyed, curly-haired Cyclops.

Genotype: _____

Gametes: _____, _____, _____, _____

b. List the possible gametes from the homozygous two-eyed, straight-haired Cyclops.

Genotype: _____

Gametes: _____, _____, _____, _____

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4. In humans, two conditions, curly hair and big noses are carried by dominant genes, while straight hair and small noses are recessive. A male with the genotype ccNn marries a woman with the genotype CCnn. What is the phenotype ratio for their potential offspring?

	Cn	Cn	Cn	Cn
cN	CcNn	CcNn	CcNn	CcNn
cn	Ccnn	Ccnn	Ccnn	Ccnn
cN	CcNn	CcNn	CcNn	CcNn
cn	Ccnn	Ccnn	Ccnn	Ccnn

_____= curly hair, big nose

_____= curly hair, small nose

_____= straight hair, big nose

_____= straight hair, little nose

5. Wolves are sometimes observed to have black coats and blue eyes. Assume that normal coat color (N) is dominant to black (n) and brown eyes (B) is dominant to blue (b). Suppose that the alpha male is black with blue eyes and the alpha female is normal with brown eyes. The female is heterozygous for both traits.

KEY **Cross _____ x _____**

N= _____

n= _____

B= _____

b=_____

(list the gametes below each genotype)

_____= normal fur, brown eyes

_____= normal fur, blue eyes

_____= black fur, brown eyes

_____= black fur, blue eyes

What percentage of the offspring will be normal fur with blue eyes?

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6. In pigeons the checkered pattern is caused by a dominant allele. A plain (non-checkered) pattern is recessive. Red color is also caused by a dominant allele and brown color by a recessive allele. Show the expected phenotypic ratio for the offspring of a cross between two heterozygous checkered heterozygous red birds.

KEY **Cross _____ x _____**
