

Dihybrid Crosses

How to set up a Dihybrid Cross

A pea plant that is heterozygous for round, yellow seeds is self fertilized, what are the phenotypic ratios of the resulting offspring?

Step 1: Determine the parental genotypes from the text above, the word "heterozygous" is the most important clue, and you would also need to understand that self fertilized means you just cross it with itself. (list alphabetically, capital letter first)

R r Y y x R r Y y

Step 2: Determine the gametes. This might feel a little like the FOIL method you learned in math class. Combine the R's and Ys of each parent to represent sperm and egg. Do this for both parents



Gametes after "FOIL": RY, Ry, rY, ry (parent 1) RY, Ry, rY, ry (parent 2)

Step 3: Set up a large 4x4 Punnett square, place one gamete set from the parent on the top, and the other on the side

	RY	Ry	rY	ry
RY				
Ry				
rY				
ry				

Step 4: Write the genotypes of the offspring in each box and determine how many of each phenotype you have. In this case, you will have 9 round, yellow; 3 round, green; 3 wrinkled, yellow; and 1 wrinkled green (list by Homozygous Dominant both traits: Homo Dom Trait 1 and Hetero Trait 2: Hetero Trait 1 and Homoz Dom Trait 2: Homozygous recessive both traits)

Dihybrid Cross Problems

1. In rabbits, grey hair is dominant to white hair. Also in rabbits, black eyes are dominant to red eyes.



KEY:

GG = gray hair

BB = black eyes

Gg = gray hair

Bb = black eyes

gg = white hair

bb = red eyes

1. What are the phenotypes (descriptions) of rabbits that have the following genotypes:

bbGg _____ BBgg _____

bbgg _____ BbGg _____

2. A male rabbit with the genotype BbGg . Determine the gametes produced by this rabbit (the sperm would have these combinations of alleles) Hint there are 4 combinations.

3. A male rabbit with the genotype bbGG is crossed with a female rabbit with the genotype Bbgg. Fill out the punnett square and determine the genotypes, phenotypes and proportions in the offspring.

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %

2. For Mendel's Pea Plants the following alleles are used:

KEY:

Round = R
 wrinkled = r
 Yellow = Y
 green = y

a) Create the punnett square of the following cross; Homozygous for round and yellow X homozygous for wrinkled and green.

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %

b) Create the punnett square of the following cross; Homozygous for round and yellow X heterozygous for shape and color.

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %

c) Create the punnett square of the following cross; Heterozygous for shape and color X heterozygous for shape and color.

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %

3. In guinea pigs, black hair is dominant to brown hair and short hair is dominant to long hair. What would be the genotypes of the following?

a) A black, long haired variety, homozygous for both traits?

b) A brown, short haired variety, heterozygous for hair length?

c) A brown, long haired variety?

4. In summer squash, white fruit color (W) is dominant over yellow fruit color (w) and disk-shaped fruit (D) is dominant over sphere-shaped fruit (d). If a homozygous white, homozygous disk-shaped fruit is crossed with a yellow, sphere-shaped fruit, what will the phenotypic and genotypic ratios be for:

a) the F1 generation?

b) the F2 generation?(show work)

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %

5. An aquatic arthropod called a Cyclops has antennae that are either smooth or barbed. The allele for barbs is dominant(B). In the same organism, resistance to pesticides is a recessive trait(r). Make a "key" show all the possible genotypes (and phenotypes) of this organism.(Hint: Use the rabbit key to help you if you're lost)



6. A Cyclops that is resistant to pesticides and has smooth antennae is crossed with one that is heterozygous for both traits. Show the genotypes of the parents.

_____ x _____

7. Set up a punnet square for the cross and show the phenotypic ratios.

					<u>Genotype</u> %
					<u>Phenotype</u> %
					<u>Proportion</u> %