

Using Punnett Squares to do a Monohybrid Cross

You can use a **Punnett Square** to figure out the possible gene combinations of offspring. Dominant genes are always written with CAPITAL letters and recessive genes are always written with lower case letters. If both genes in the pair are the same, the trait is **homozygous**. If each trait in the pair is different, the trait is **heterozygous**. The genetic makeup of the individual is the **genotype** and the observable physical characteristics are the **phenotype**.

Here is a list of **dominant** and **recessive** traits. You will be using these traits to predict the results of various crosses.

Trait	Dominant	Recessive
Pod Shape	Smooth (S)	Constricted (s)
Pod Color	Green (G)	Yellow (g)
Flower Position	Axial (A)	Terminal (a)
Plant Height	Tall (T)	Short (t)

Follow the steps ahead for doing a Punnett Square.

Cross a plant that is heterozygous for green pods with a plant that has yellow pods.

1. What are the genotypes of the parents? _____ X _____
2. What are the possible gametes that the parents can produce?
 - a. Heterozygous Green Pod - ____ and ____
 - b. Yellow Pod - ____ and ____
3. Enter these gametes at the top of a Punnett Square. On the top, place the gametes for one parent and on the side place the gamete from the other parent. It does not matter which parent you place on the top and which parent you place on the side.

4. Complete the Punnett Square above by writing the alleles from the gametes in the appropriate boxes. This represents fertilization, when the male and female gametes come together. Look at the different combinations above.
5. Next you need to figure out the **phenotypes**. To do this you must consider dominant and recessive traits. What are the phenotypes of the offspring and how many of each are there? _____ and _____.
State this as a phenotypic ratio: _____.
6. Next, look at the Punnett Square to see the **genotypes**. You need to state these in words (ex. Heterozygous or homozygous). What are they and how many of each is there? _____ and _____. State this as a genotypic ratio: _____.

Those are all the steps that you need to go through to do a monohybrid Punnett Square! Now let's practice! Refer to the chart at the top of this page to do the crosses. **Use words and numbers when doing the ratios.**

1. Nn X NN

What are the phenotypes of the parents? _____ and _____.

In words, what are the genotypes? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

2. Aa X Aa

What are the phenotypes of the parents? _____ and _____.

In words, what are the genotypes? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

3. Cross two plants that are heterozygous for green pods.

In letters, what are the genotypes? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

4. Cross a plant that is homozygous for axial flowers with a plant that is homozygous for terminal flowers.

In letters, what are the genotypes? _____ and _____.

Do the Punnett Square.

Genotypic Ratio: _____

Phenotypic Ratio: _____

5. Cross a heterozygous tall plant with a short plant.

In letters, what are the genotypes? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

6. Cross a plant with constricted pods with another plant with the same phenotype.

In letters, what are the genotypes? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

7. A tall plant is crossed with a short plant and some of the offspring are short.

What are the genotypes of the parents in words? _____ and _____.

Genotypic Ratio: _____

Phenotypic Ratio: _____

8. Three-fourths (3/4) of the plants produced by 2 unknown parents have axial flowers and one-fourth (1/4) have terminal flowers.

What are the genotypes of the parents? _____ and _____.

Show how you got your answer on the Punnett Square below.
