Predicting the inheritance of alleles

Monohybrid Crosses

Geneticists use **monohybrid crosses** to study inheritance. The study involves the inheritance of two alleles for a single characteristic. **A Punett Square** is a diagram used to predict the probability of different genotypes and phenotypes in the offspring resulting from a cross between two individuals.

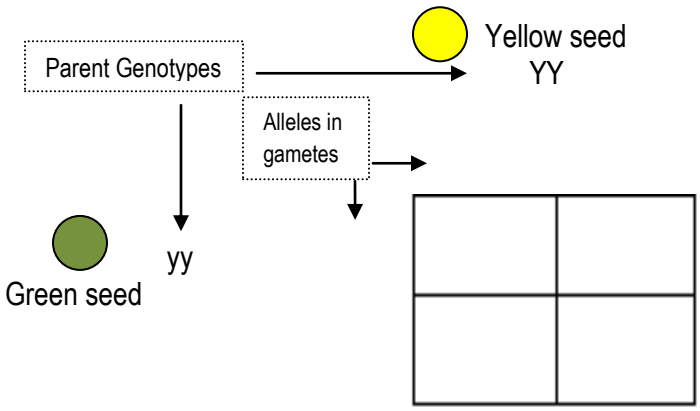
<u>Sample Problem 1</u>: Homozygous Dominant / Homozygous recessive Cross

In pea plants, the allele for yellow seed colour (Y) is dominant over that of a green seed colour (y). Consider a cross between a pea plant that is homozygous for yellow seeds and a plant that is homozygous for green seeds. Create a Punnett Square to determine the possible genotypes and phenotypes of the offspring.

Solution

1) The plant that is homozygous for yellow seed colour has a genotype that is YY.
2) The plant that is homozygous for green seed colour has a genotype that is yy.

Step 1: Draw a Punnett Square that shows the genotypes of the two parents and the gametes that they can produce.

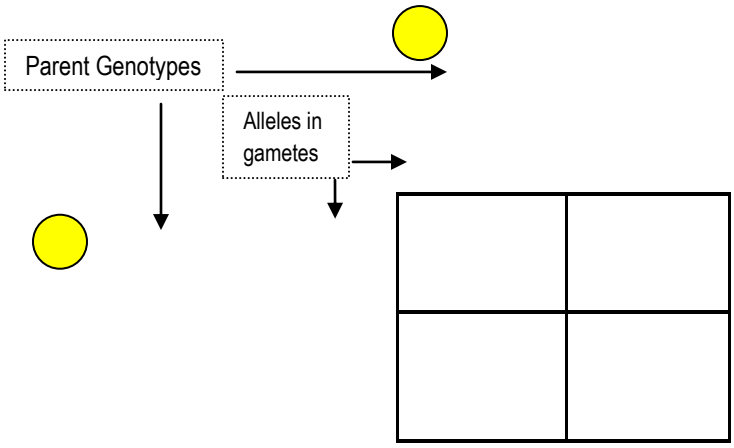


Step 2: Fill in the boxes of the Punnett Square by combining the gametes corresponding to each row and colomn.

Step 3: Print the results of the cross in a clear and organised manor as demonstrated below:

<u>Results of a YY x yy cross</u>

F_1 genotypes:
F_1 phenotypes:

<u>Sample problem 2:</u> Heterozygous / Heterozygous Cross

Two heterozygous yellow seed plants (Yy) from the F_1 generation are crossed. Determine the genotype and the phenotype ratios of the F_2 generation. Follow the same steps as the last example