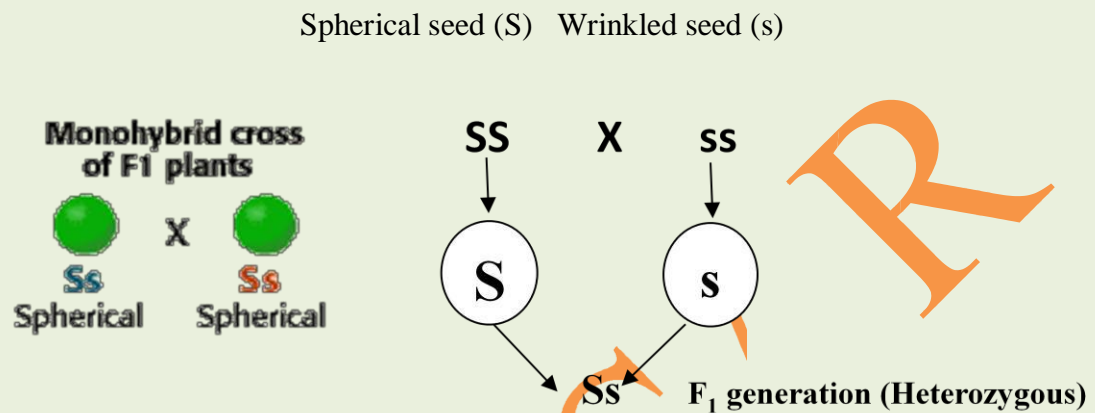


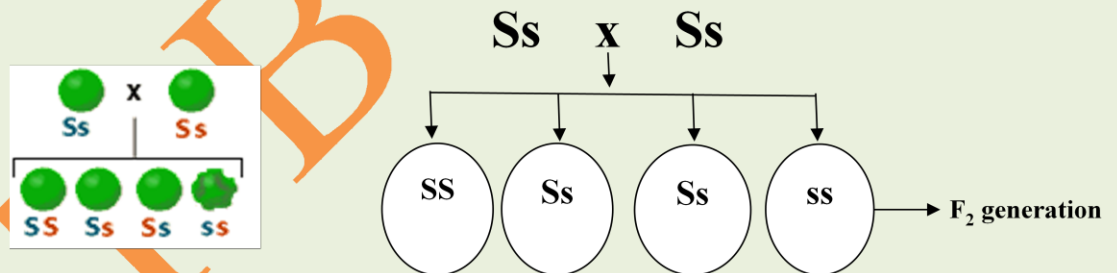
### A. Monohybrid cross – problems:

1. In pea plants spherical seeds (S) are dominant to wrinkled seeds (s). In a genetic cross of two plants that are heterozygous for the shape trait, what will be the fraction of offspring should have spherical seeds?



The F<sub>1</sub> generation is heterozygous with one dominant and one recessive allele. This is obtained by crossing dominant (S) and recessive (s) seeds. This heterozygous (Ss) plants results in spherical seeds.

Self pollination of F<sub>1</sub> generations (Ss x Ss)



75% are spherical  
25% are wrinkled

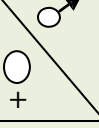
The plants obtained in F<sub>2</sub> generation are the seeds self pollinated obtained in F<sub>1</sub> generation.

**Result:** Three are spherical seed plants  
One is Wrinkled

**Phenotypic Ratio : - 3:1**

**Genotypic Ratio :- 1:2:1**

### Punnet Square

	<b>S</b>	<b>s</b>
<b>S</b>	<b>SS</b>	<b>Ss</b>
<b>s</b>	<b>Ss</b>	<b>ss</b>

SS – 1= Spherical (Dominant, homozygous)

Ss - 2 = Spherical (Heterozygous)

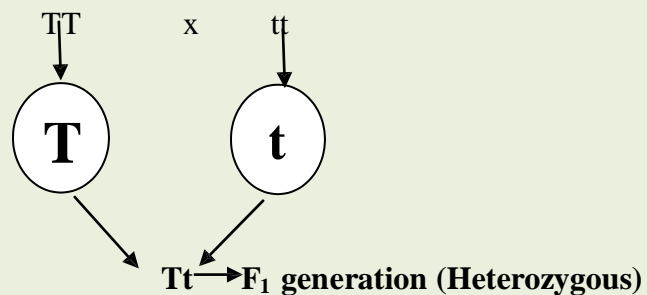
ss- 1= Wrinkled (Recessive, homozygous)

**Problem 2:** In Mendel's experiment homozygous Tall pea plants (TT) were crossed with homozygous short plants (tt). Mendel collected the seeds from this cross, grew F1 generation plants, let them self pollinate to form a second generation, and analyzed the seeds of resulting F2 generation. What are the results obtained?

Tall plants (TT) are dominant (Homozygous)

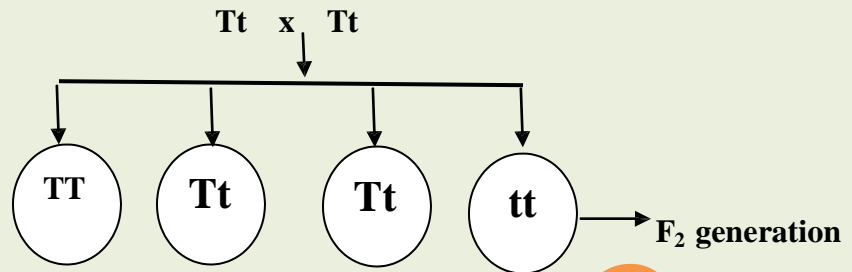
Short plants (tt) are recessive (Homozygous)

Crossing of the parents both dominant and recessive results in



The resulting F1 generation (Tt) is heterozygous. This heterozygous results in Tall plants.

Self crossing or Monohybrid cross ( $Tt \times Tt$ ):



75% Tall plants  
25% Short plants

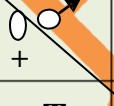
The plants obtained in F<sub>2</sub> generation are the seeds self pollinated obtained in F<sub>1</sub> generation.

**Result:** Three are Tall plants  
One is Short plant

**Phenotypic Ratio : - 3:1**

**Genotypic Ratio :- 1:2:1**

**Punnet Square**

	<b>T</b>	<b>t</b>
<b>T</b>	<b>TT</b>	<b>Tt</b>
<b>t</b>	<b>Tt</b>	<b>tt</b>

TT – 1 = Tall plants (Dominant, homozygous)

Tt - 2 = Tall Plants (Heterozygous)

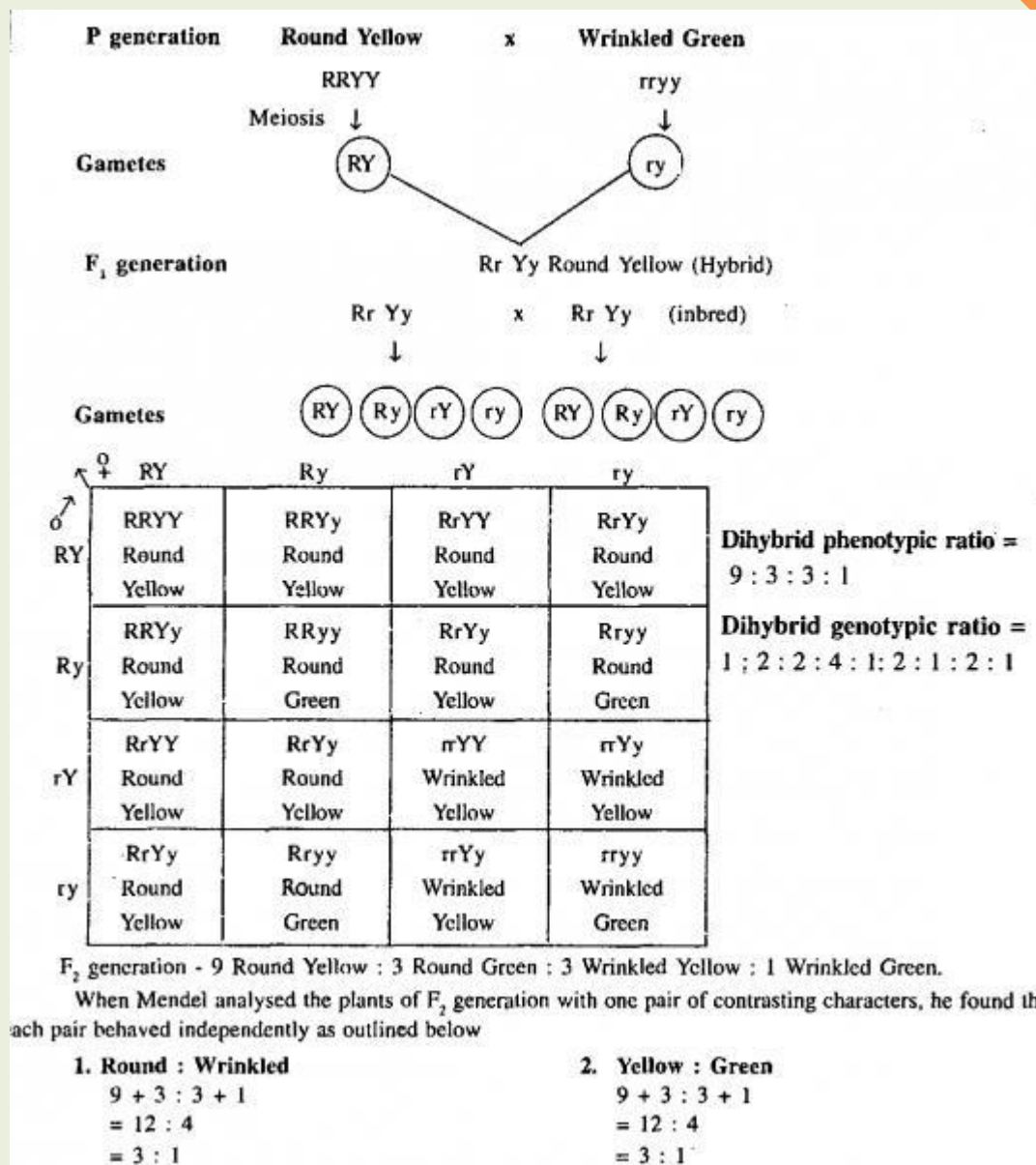
tt- 1 = Short Plants (Recessive, homozygous)

## Dihybrid Cross:

**Problem I:** In a genetic experiment, a scientist crossed a pea plant (Yellow and Round seeds) with another pea plant (Green and Wrinkled) and got Yellow and Round seeded plants in F<sub>1</sub> generation. Then Predict the F<sub>2</sub> generation by using Mendel dihybrid cross.

**Note:** (Yellow-Round (YYRR) is dominant on Green-Wrinkled (yyrr)).

Solution:



$RRYY = 1$  (Homozygous Round and Homozygous Yellow)

$RRYy = 2$  (Homozygous Round and Heterozygous Yellow)

$RrYY = 2$  (Heterozygous Round and Homozygous Yellow)

$RrYy = 4$  (Heterozygous Round and Heterozygous

Yellow)  $rrYY = 1$  (Homozygous Wrinkled and

Homozygous Yellow)  $Rryy = 2$  (Heterozygous Round

and Homozygous Green)  $RRyy = 1$  (Homozygous Round and

Heterozygous green)

$rrYy = 2$  (Homozygous Wrinkled and Heterozygous Yellow)

$rryy = 1$  (Homozygous Wrinkled and Homozygous Green)

**Problem – II:** A student allowed a guinea pig (White and Tall haired) to cross another guinea pig (Black and Short haired) and got White and Tall haired guinea pig in F<sub>1</sub> generation. Then Predict the F<sub>2</sub> generation by using Mendel dihybrid cross.

**Note:** (White and Tall (WWTT) is dominant on Black and Short

(wwtt). Solution:

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