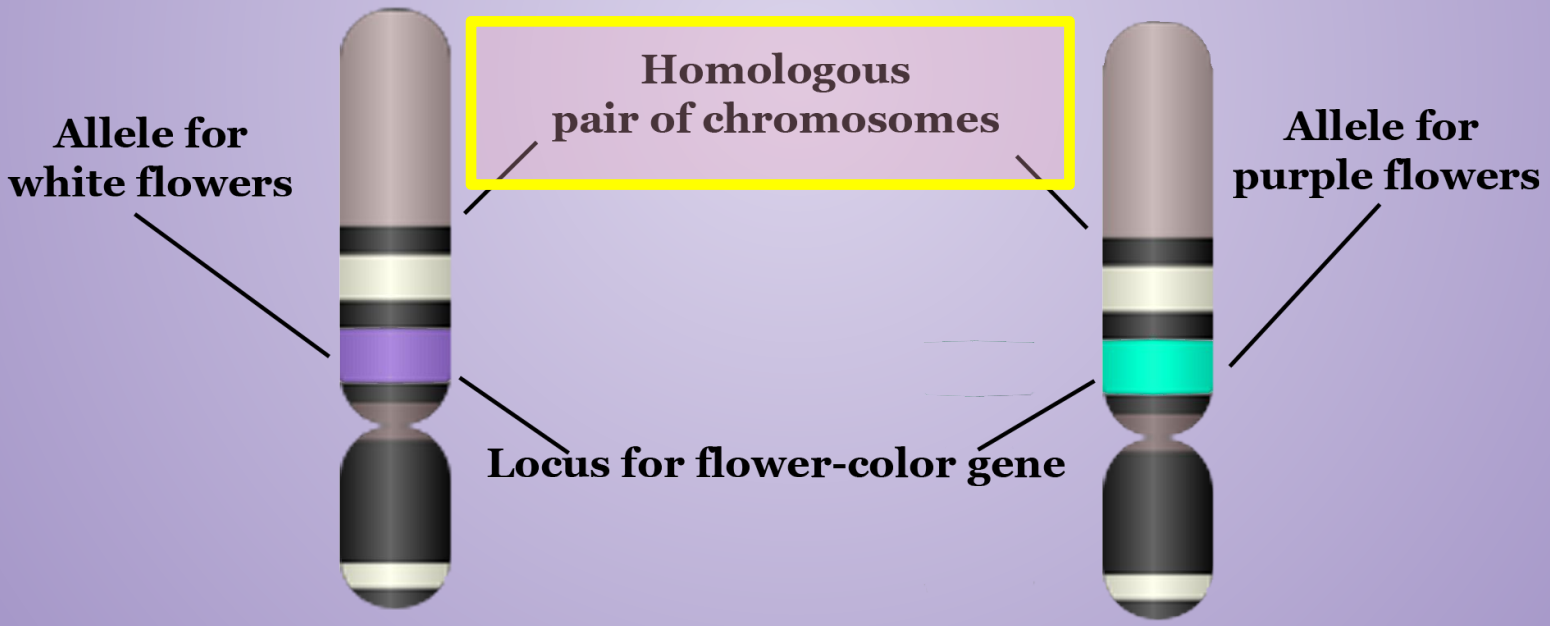
Mendelian Genetics

Allele

Alleles: different versions of one gene on a chromosome
Locus: fixed location on a chromosome where the gene is found

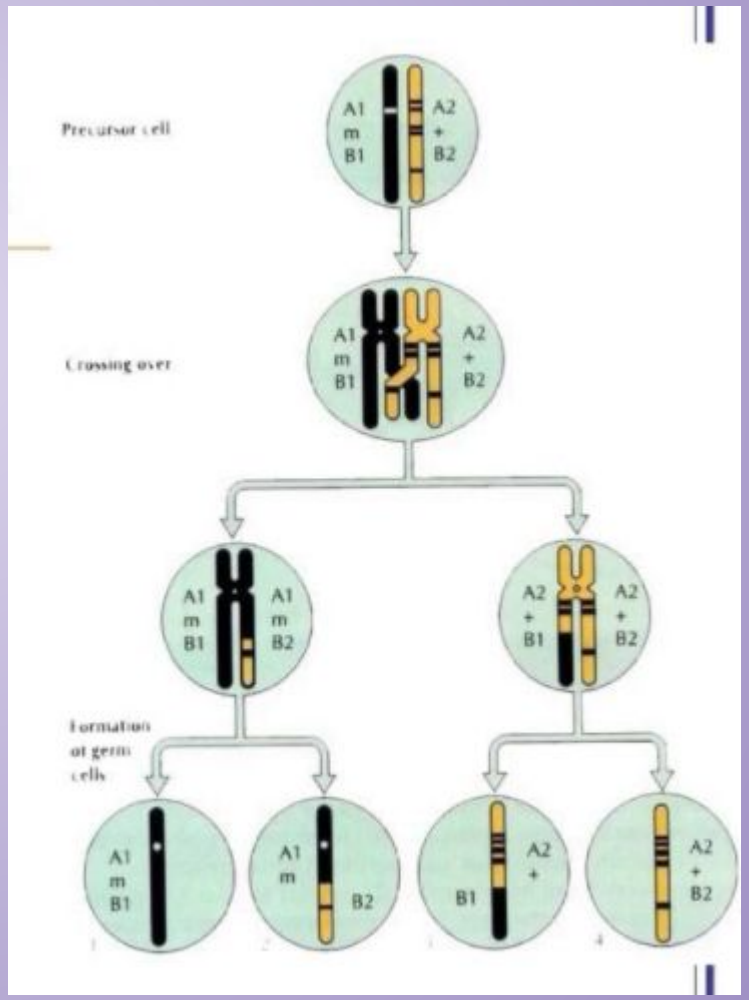


- We use letters to represent alleles.

For Example: The allele for flower color could be "F"

Law of Segregation

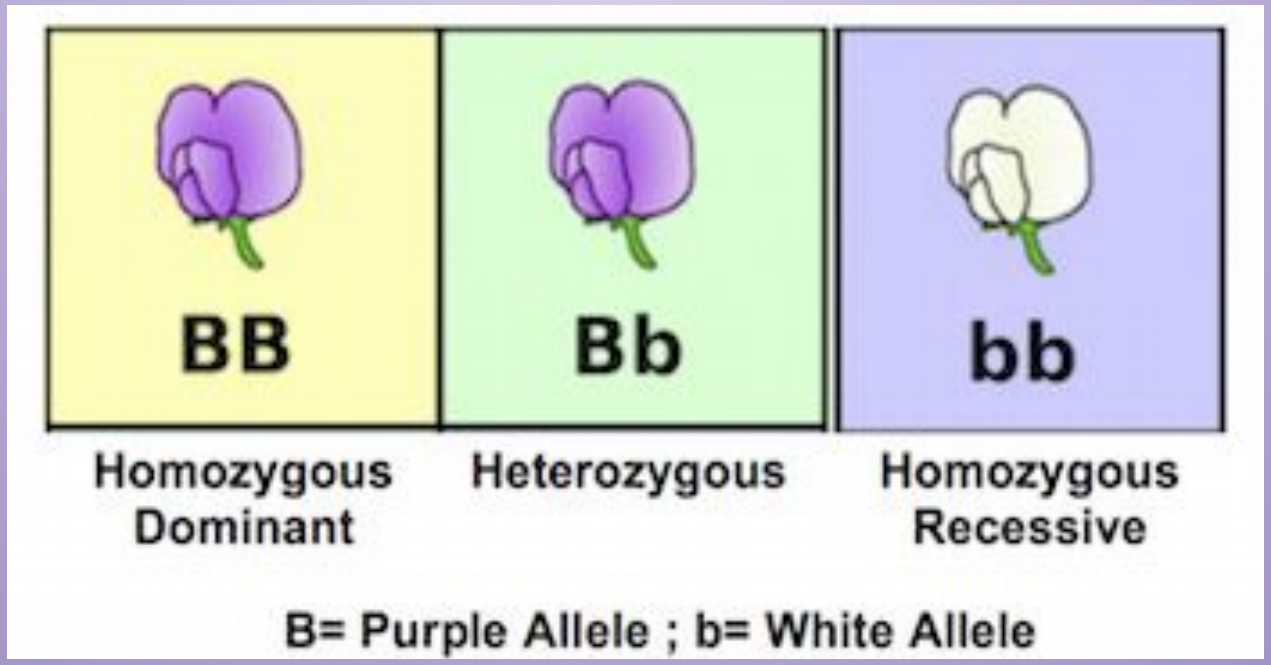
- Chromosome pairs separate during meiosis so that each gamete receives one allele for a given trait.



Dominant vs. Recessive alleles

Recessive- A trait that is only expressed when the dominant allele is absent

Dominant- A trait that is always expressed if present



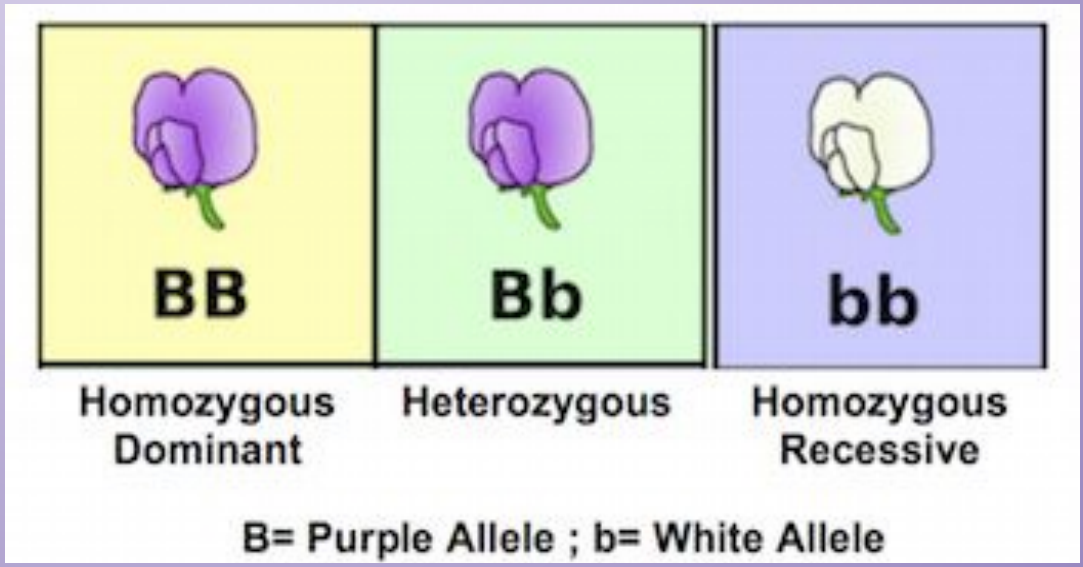
Heterozygous/ Homozygous

- **Heterozygous**- has different alleles for a trait

  Ff, Aa, Gg

- **Homozygous-** has the same alleles for a trait

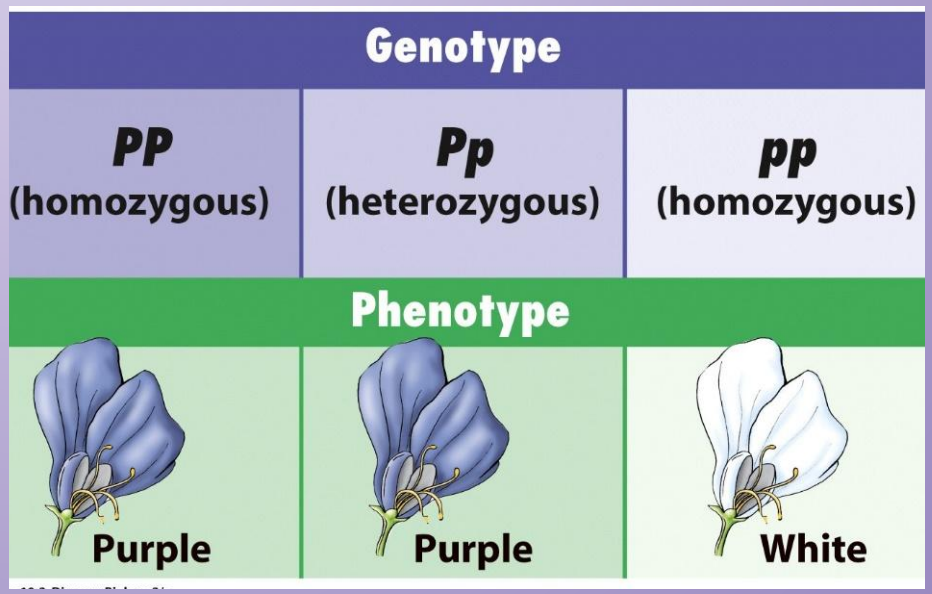
  FF, ff, AA, aa, GG, gg



Genotype/Phenotype

- **Genotype**- The **genetic composition** of an organism.
  (Genotypic ratio is always written from most dominant to most recessive.)
  Ex: PP : Pp : pp 1:2:1

- **Phenotype**- The **physical appearance** of an organism.
  (phenotypic ratio is always written from most dominant to most recessive.)
  Ex: Purple: white



Knowledge check

Circle all the genotypes.

Box all the phenotypes.

BB

Tt

Brown hair

Ff

No spikes

aa

Tall

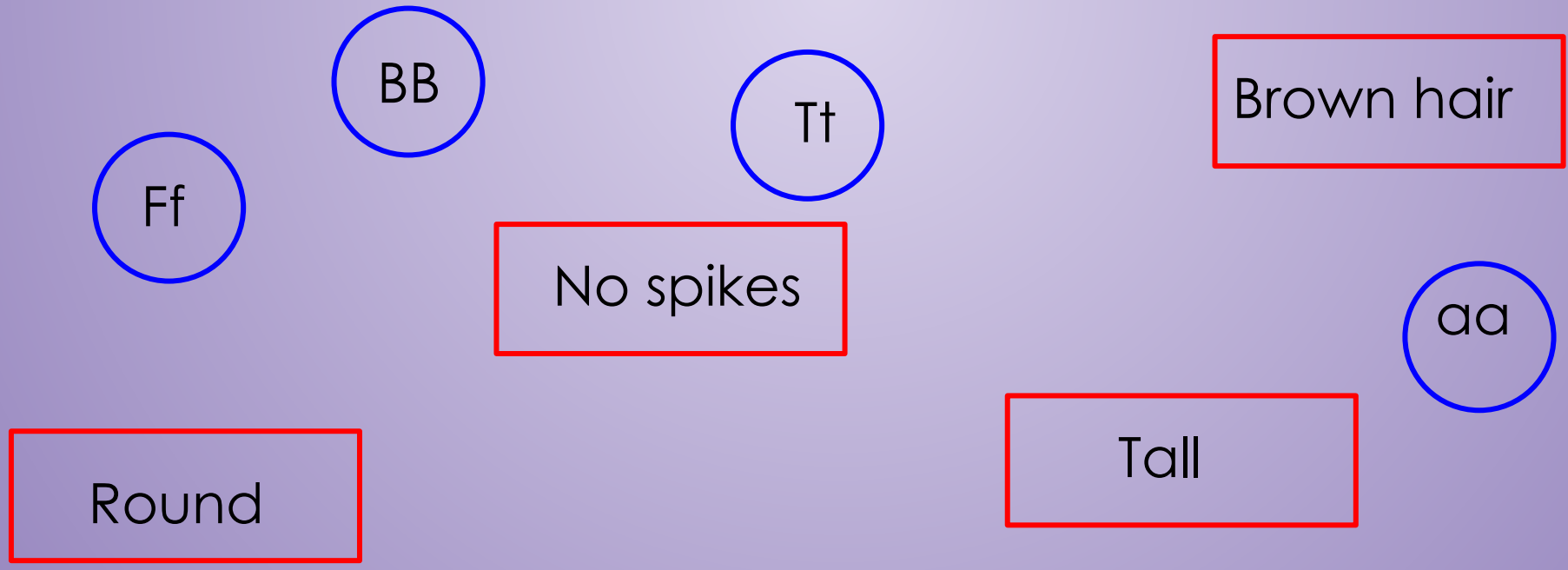
Round

Students, draw anywhere on this slide!

Knowledge check

Circle all the genotypes.

Box all the phenotypes.

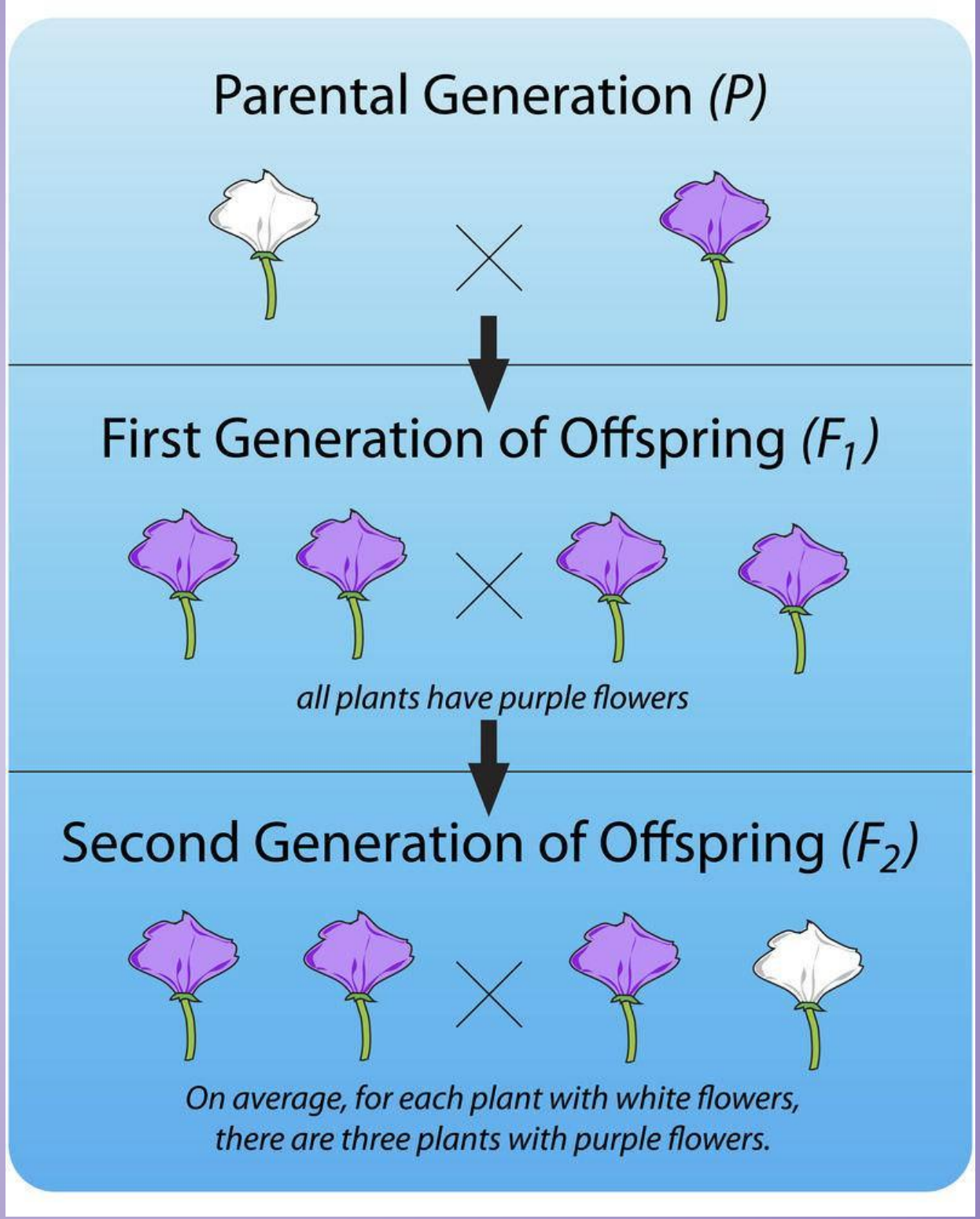


P, F_1, F_2

P= parents

F_1= first generation

F_2= second generation
-produced by crossing the first generation with itself
(F_1 X F_1 = F_2)



Complete Dominance

- Complete Dominance: One allele is completely dominant over the other
  - B represents **Brown** color.
  - b represents **Black** color.
- What color would these be?
  - BB **Brown**
  - Bb **Brown**
  - bb **Black**

Knowledge check

Circle the correct term for genotype AA?

Homozygous recessive

Heterozygous

Homozygous dominant

Knowledge check

Circle the correct term for genotype AA?

Homozygous recessive

Heterozygous

Homozygous dominant

Knowledge check

Use the alleles **A** and/or **a**.

- What is the genotype of a heterozygous individual?
- What is the genotype of a homozygous recessive individual?

Students, draw anywhere on this slide!

Knowledge check

Use the alleles **A** and/or **a**.

- What is the genotype of a heterozygous individual?

Aa

- What is the genotype of a homozygous recessive individual?

aa

A= Brown eyes, dominant
a= blue eyes, recessive

- What is the phenotype of someone who has Aa?

A= Brown eyes, dominant
a= blue eyes, recessive

- What is the phenotype of someone who has Aa?

Brown

A= Brown eyes, dominant
a= blue eyes, recessive

- What is the phenotype of someone who has aa?

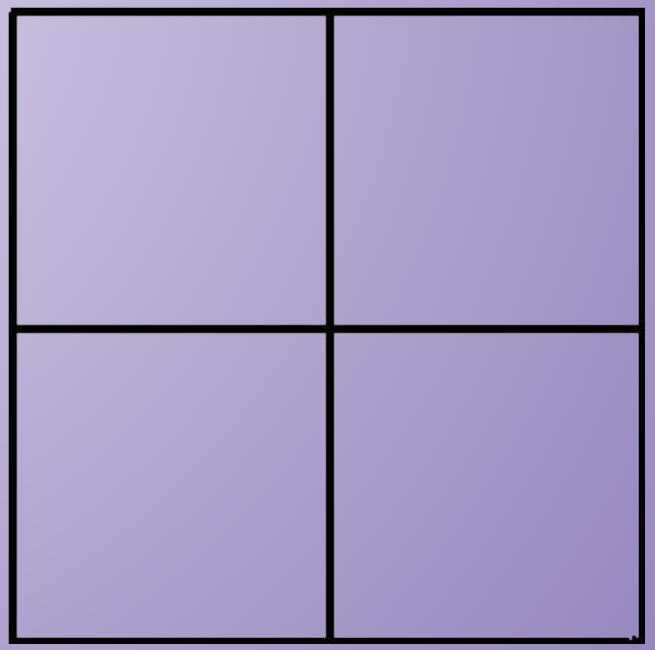
A= Brown eyes, dominant
a= blue eyes, recessive

- What is the phenotype of someone who has aa?

Blue

Punnett Squares

- The alleles from the parents go on each side of the punnett square; The male on one side and the female on the other.
  - **T= tall t= short**
  - Mother's Genotype: TT
  - Father's Genotype: tt



What percentage of the offspring will be tall?

100%

What percentage of the offspring will be short?

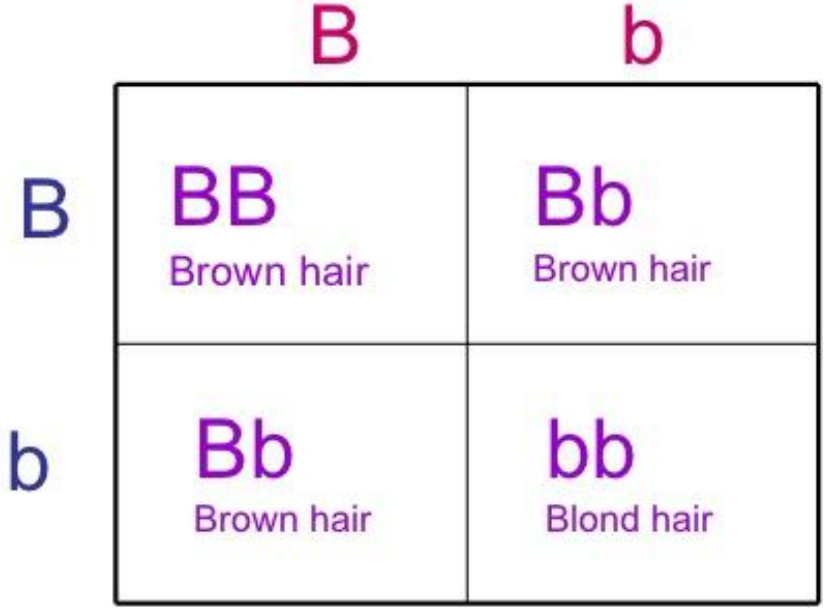
0%

Example w/ ratios

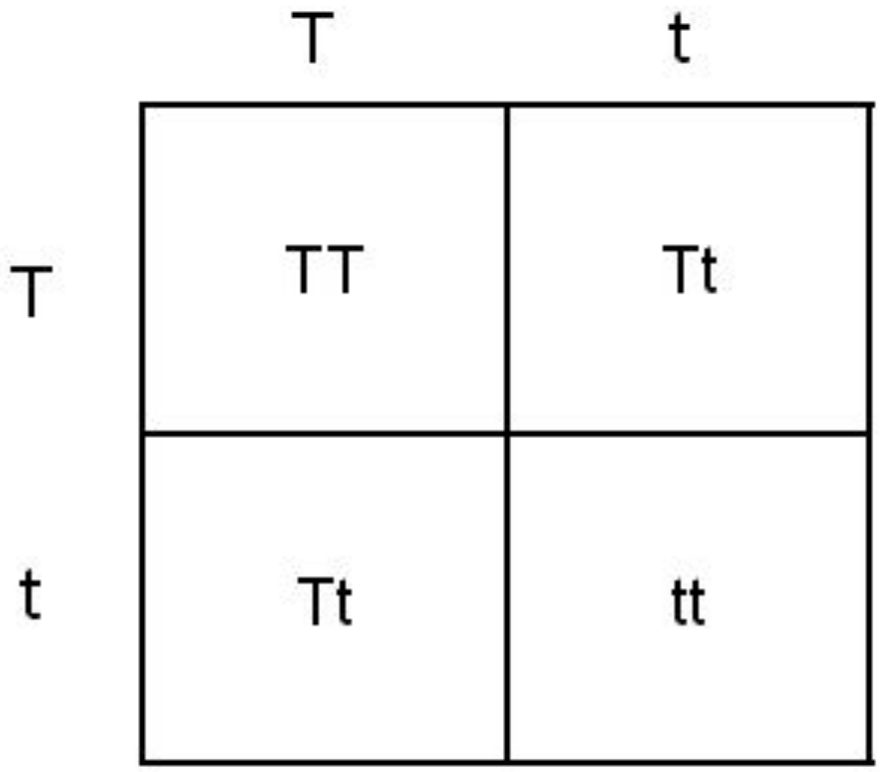
Genotypic ratio of offspring
1BB : 2Bb : 1bb

Phenotypic ratio of offspring
3 brown hair : 1 blond hair

(75% chance) (25% chance)



Dominant and Recessive
(T = Tall & t = short
Cross: Tt x Tt

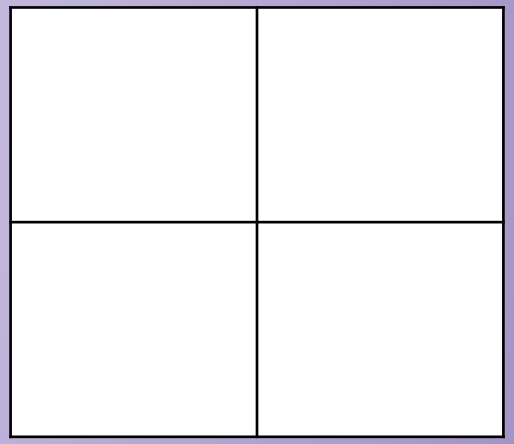


Genotypic ratio: 1 : 2 : 1 (TT=25% Tt=50% tt=25%)

Phenotypic ratio: 3 : 1 (Tall=75% Short=25%)

Starter
(monohybrid cross)

Long wings (L) are dominant over short wings (l) in fruit flies.
A heterozygous fly mates with a short winged fly.



a. What is the genotypic ratio of the offspring?_____

b. What is the phenotypic ratio of the offspring?_____

c. What is the probability that the offspring will have short wings?_____%

Starter
(monohybrid cross)

Long wings (L) are dominant over short wings (l) in fruit flies.
A heterozygous fly mates with a short winged fly.

Ll **ll**

	L	**l**
l	**Ll**	**ll**
l	**Ll**	**ll**

a. What is the genotypic ratio of the offspring? **LL : Ll : ll** **0:2:2**

b. What is the phenotypic ratio of the offspring? **Long: short** **2:2**

c. What is the probability that the offspring will have short wings? **50** %