# Punnett Squares

a visual graph Used to calculate the probability (chance) of passing a trait on to offspring

The 4 monohybrid crosses.

Essential Questions

1. What is the genotype ratio when we have a cross between purebred recessive and purebred dominant parents?

2. What is the phenotype ratio when we cross two hybrids together?

3. When we do a test cross, what do we always cross with?

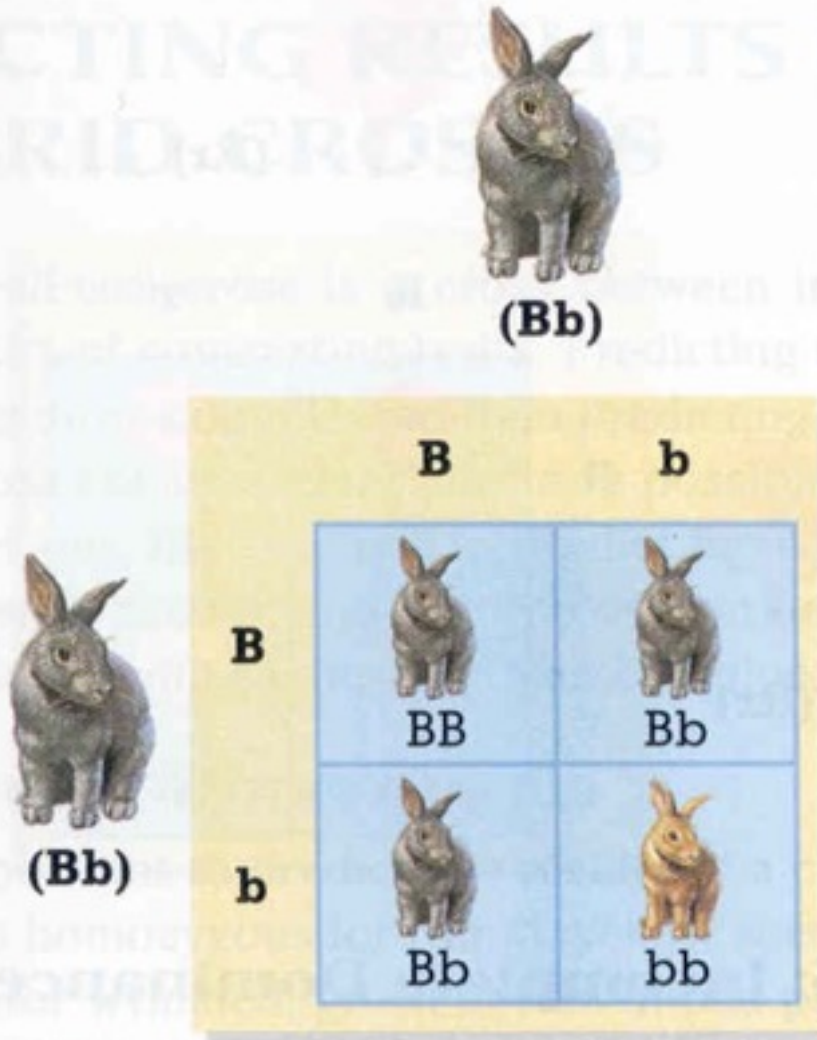# 1. Purebred Dominant x Purebred Recessive (PP x pp)
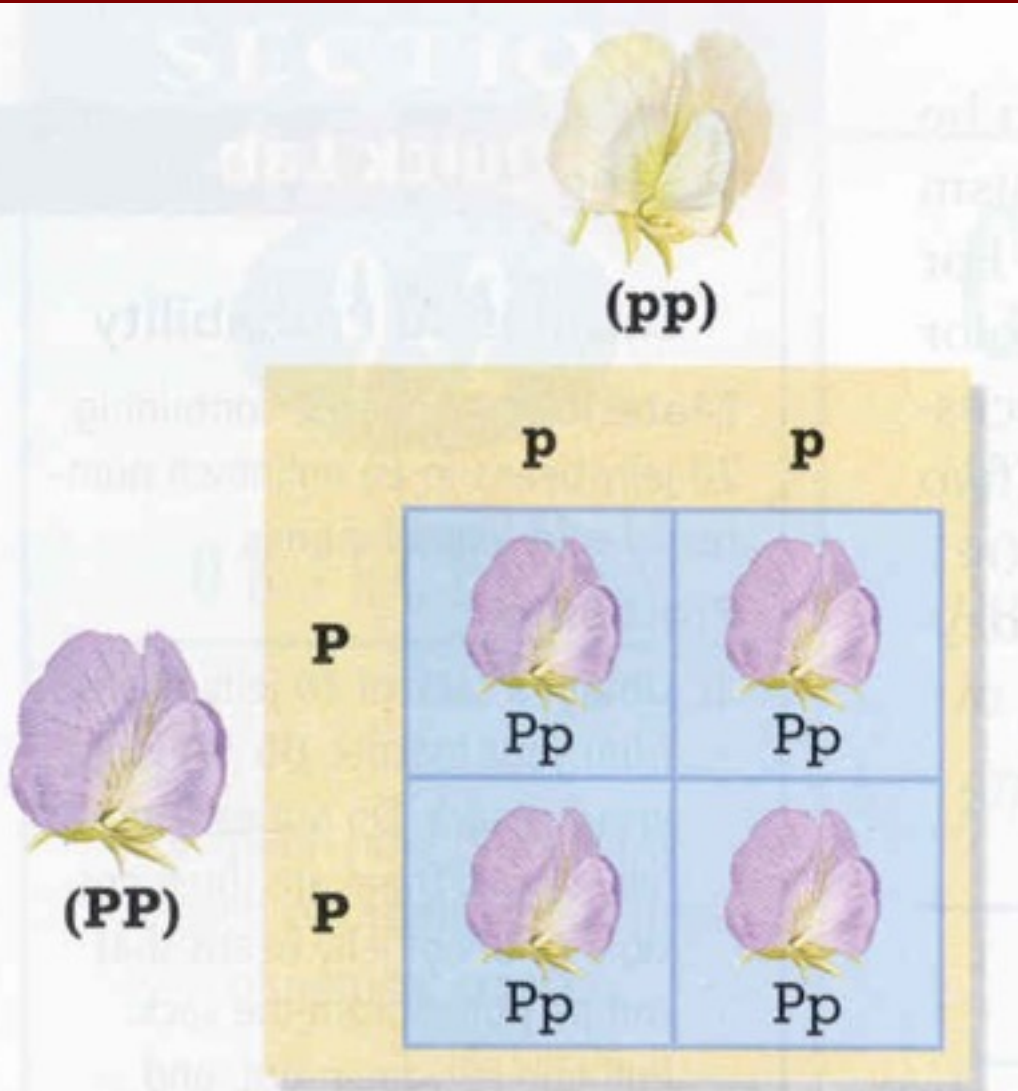
- Genotype Ratio: 4/4 Pp
- Phenotype Ratio: 4/4 Dominant

2. Purebred Dominant x Hybrid (BB X Bb)
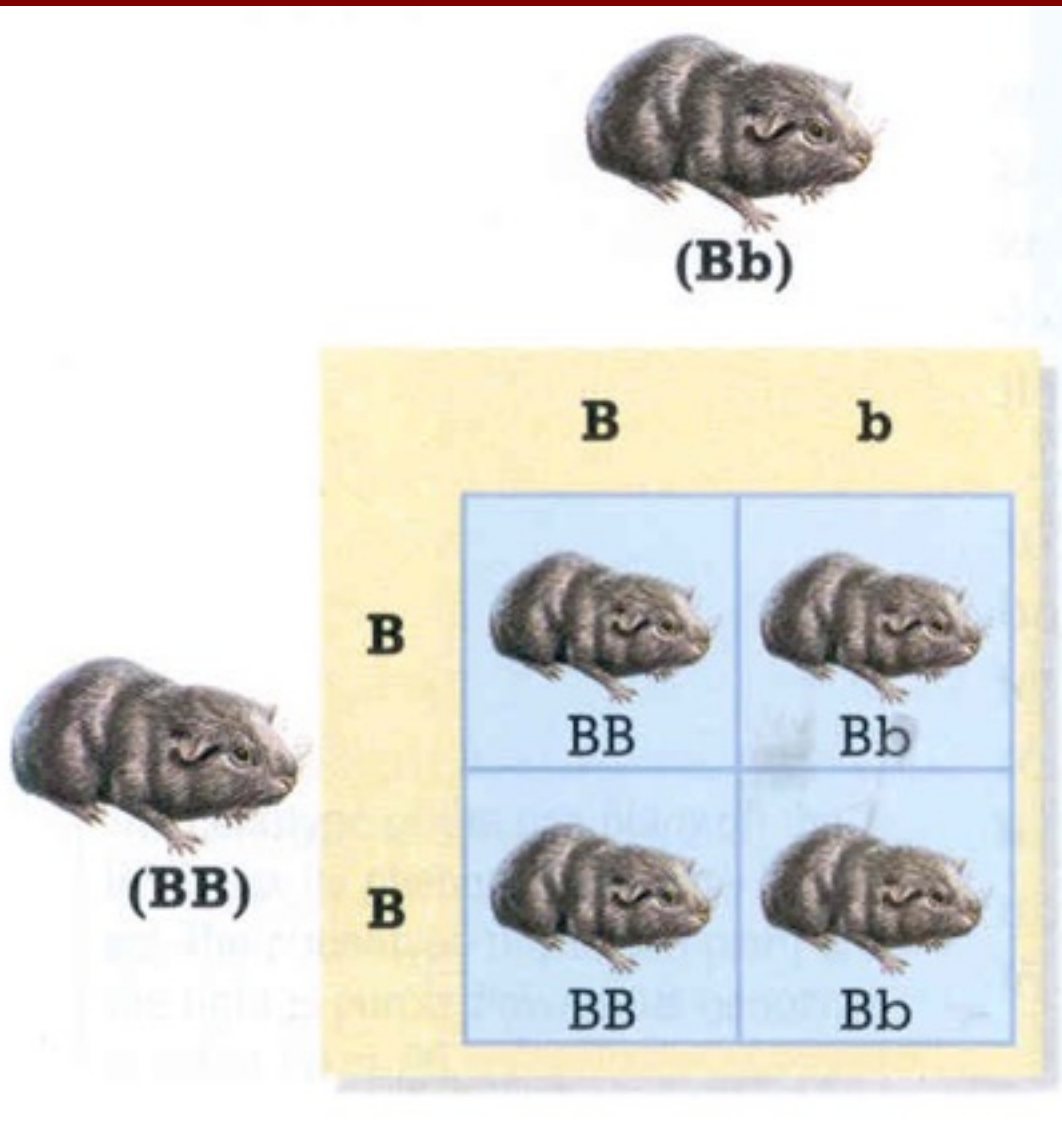
- Genotype Ratio:
  2/4 BB: 2/4 Bb
  1BB:1Bb
  50%BB:50%Bb

- Phenotype Ratio:
  4/4 Dominant

3. Hybrid x Hybrid (Bb x Bb)

- Genotype Ratio:
  - ¼ BB: 2/4 Bb: ¼ bb
  - 1BB:2Bb:1bb
  - 25%BB:50%Bb:25%bb
- Phenotype Ratio:
  - 3/4Dominant:
  - 1/4Recessive

4.) Hybrid x Purebred recessive

Bb x bb

Genotype Ratio
   2/4Bb:2/4bb
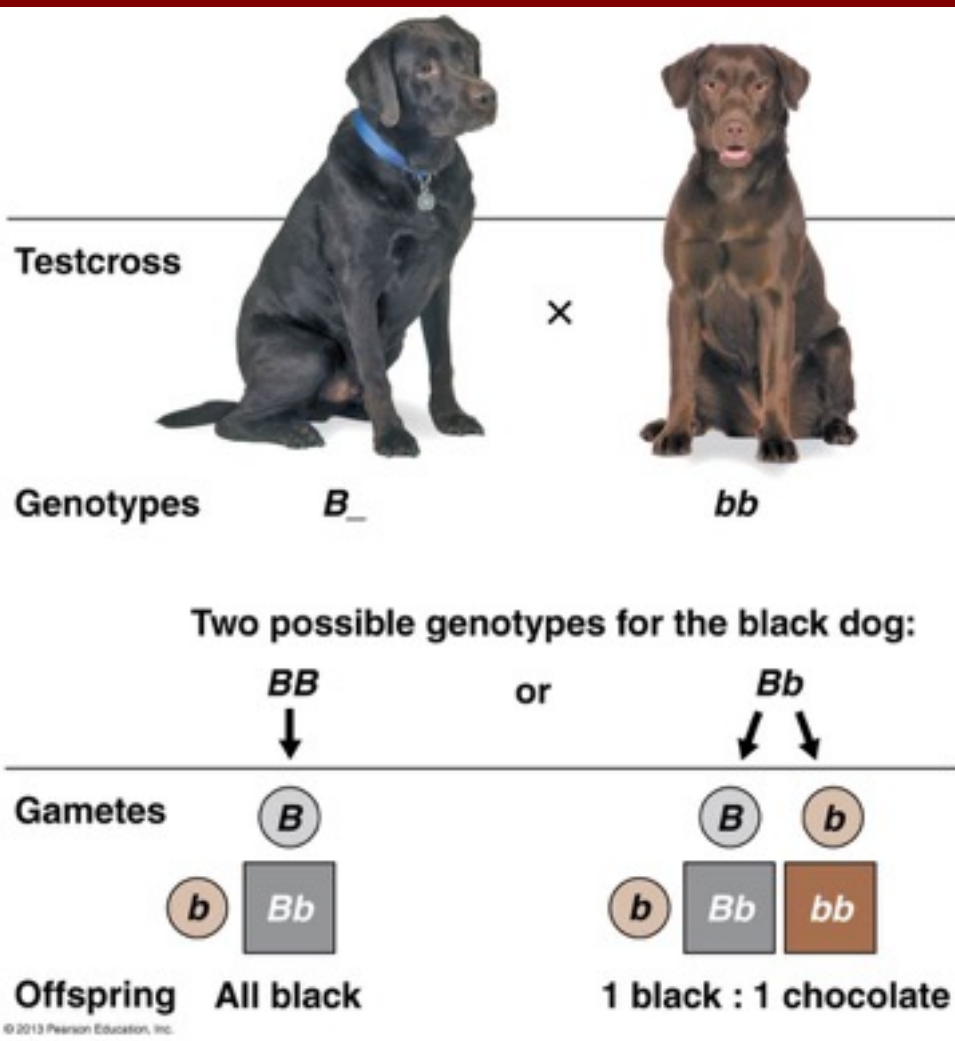*Phenotype Ratio*
   2/4 Dominant: 2/4 Recessive

	b	b
B	Bb	Bb
b	bb	bb

	b	b
B	Bb	Bb
B	Bb	Bb

Testcross

Testcross

Genotypes B_ ✕ bb

Two possible genotypes for the black dog:

BB or Bb

Gametes B B b

b Bb b Bb bb

Offspring All black 1 black : 1 chocolate

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- Determines the genotype of an individual whose genotype is unknown
  - To perform a test cross, you cross the individual with an unknown genotype with a homozygous recessive individual
  - The resulting offspring can reveal the unknown allele

Example: Testcross

In guinea pigs, black coats are dominant over brown coats. How would you determine the genotype of a guinea pig with a black coat?

Perform a testcross!

Trait: Coat color

Alleles: B = black
b = brown

Possible Genotypes for test subject: BB or Bb

Possibility 1: BB x bb

Possibility 2: Bb x bb

	B	B
b	Bb	Bb
b	Bb	Bb

	B	b
b	Bb	bb
b	Bb	bb

What this tells us: If none of the

What this tells us: If any of the

Summary of the 4 crosses

Cross	Genotype Ratio	Phenotype Ratio
BB x bb	All Bb	All Dominant
BB x Bb	2BB:2Bb	All Dominant
Bb x Bb	1BB:2Bb:1bb	3 Dominant: 1 Recessive
Bb x bb	2Bb:2bb	2 Dominant: 2 Recessive