Genetics & Punnett Squares

Terms to know!

- Homozygous- contains 2 identical alleles (letters) for the same trait, AA, BB, cc HOMO = SAME
- Heterozygous- contains 2 different alleles (letters) for the same trait, Aa, bB, Cc HETER = DIFFER
- Phenotype- Physical appearance of a trait, coat color, blood type. Physical Description!
- Genotype- Genetic makeup AA, Aa, aa. Letters!
- Gene – Codes for a trait.
- Allele- Specific gene for specific trait.
- F1 = First cross offspring mating. Inside P square.
- F2 = Second cross offspring

HETEROZYGOATS

Just allele uneven.

Let’s practice . . .

- Are these homozygous or heterozygous?
- EE
- AA
- Cc
- dd
- t t
- Bb
- LL
- Pp
- jj

What are **Dominant Genes**?

- The gene that expresses itself (capital letter used)
- These hide the recessive gene if there is complete dominance.
- Some examples of dominant traits in humans are:
  - Broad lips (BB or Bb)
  - Second toe longer (TT or Tt)
  - Brown eyes (BB or Bb)
  - Freckles (FF or Ff)
  - Rolling tongue (RR or Rr)
  - Detached earlobe (EE or Ee)

What are **Recessive Genes**?

- The gene that is overshadowed by a dominant gene – hidden by dominant
- Recessive genes can only express themselves when there are two (aa)
- Some examples of recessive traits in humans are:
  - Thin lips (bb)
  - Color blindness (cc)
  - Near sightedness (nn)
  - No dimples (dd)
  - Attached earlobes (ee)

Let’s practice . . .

- Are these dominant or recessive?
- EE
- AA
- Cc
- dd
- t t
- Bb
- LL
- Pp
- jj

Mendel's Laws

- Law of Segregation
  - During meiosis all alleles separate from each other
  - Alleles for a trait are then "recombined" at fertilization

Mendel's Laws

- Law of Independent Assortment
  - Alleles for *different* traits are distributed to offspring independently of one another.
  - Red hair and freckles does not travel together!
  - NO TWO TRAITS TRAVEL TOGETHER! These laws are why siblings look different even though they have the same parents!

Punnett Square (Mono-Hybrid)

Fill in this square on your paper.

What does a Punnett square show?

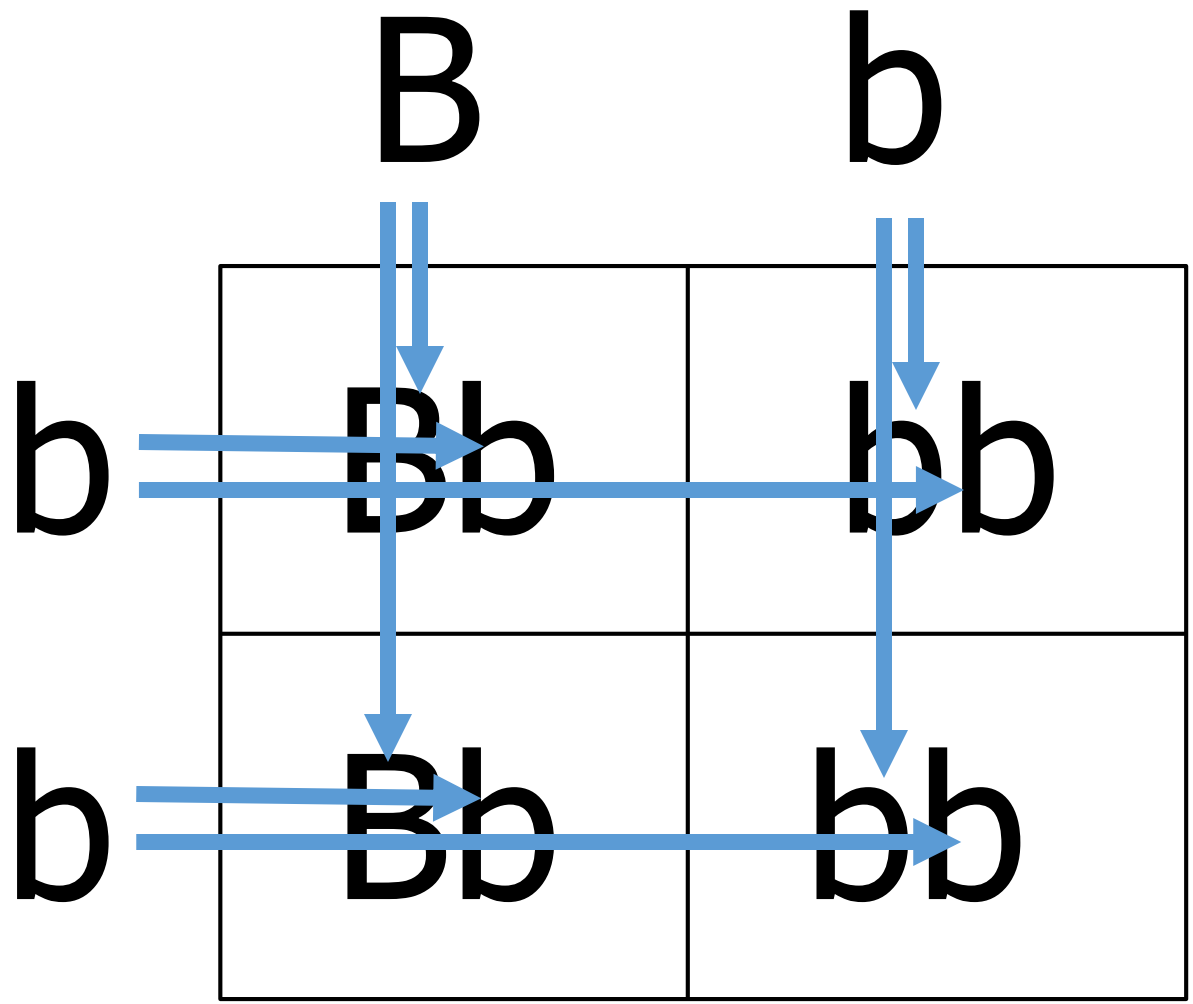
Parents are **Bb X bb**

B – Black coat

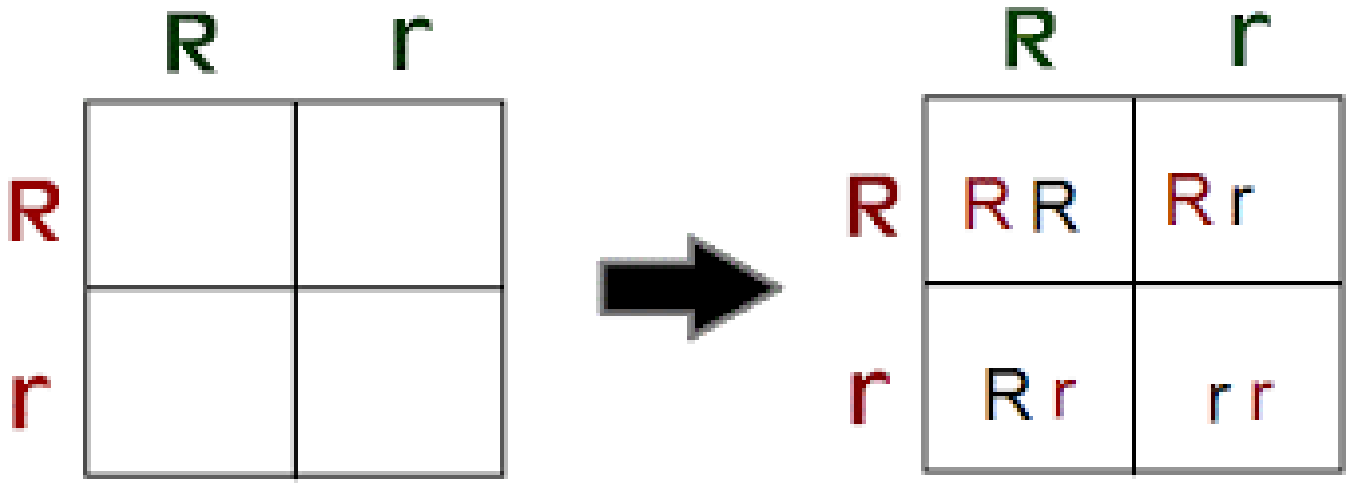
b – white coat

	B	b
b	25%	25%
b	25%	25%

The dominant trait is black fur, the recessive is white.



Another look . . .



Genotypes: BB, Bb, bb – What is the ratio?
Phenotypes: Black, White - What is the ratio?

	B	b
b	Bb	bb
b	Bb	bb

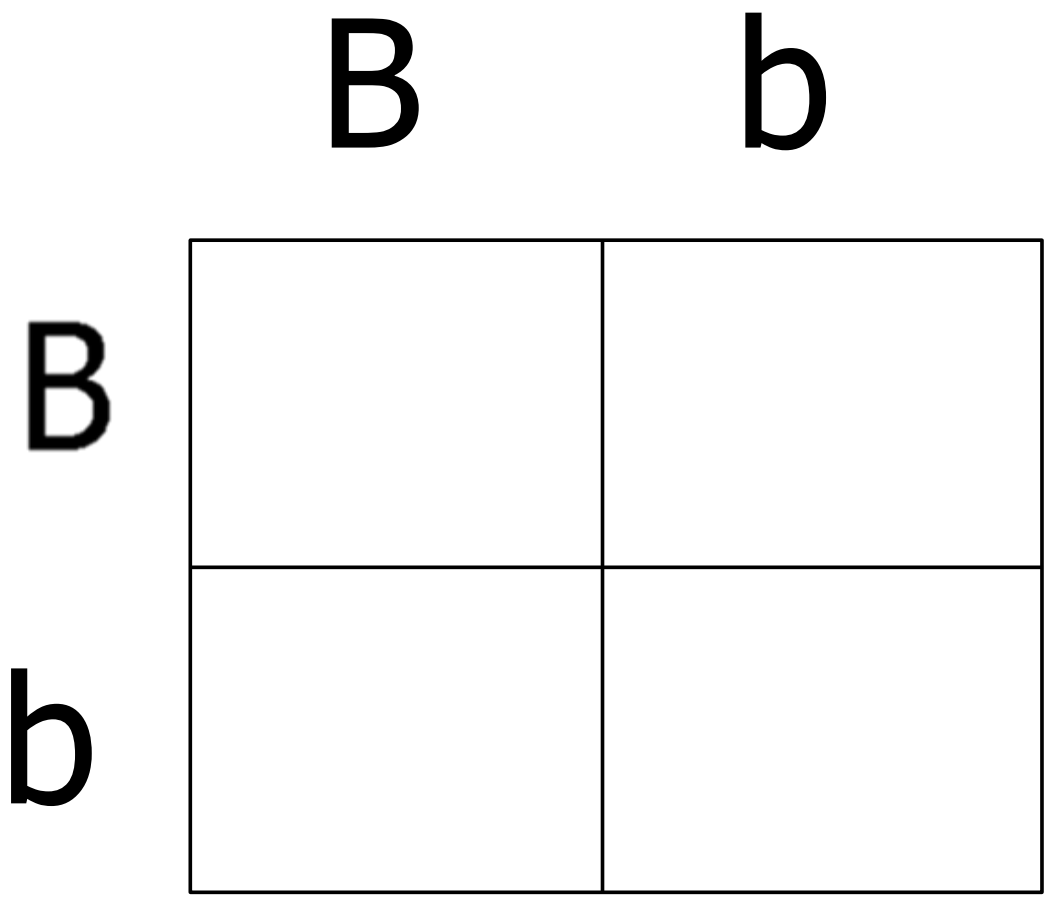
RATIOS:

Genotypes: Bb, bb (50:50 = 1:1)

Phenotypes: Black, White (50:50 = 1:1)

	B	b
b	Bb	bb
b	Bb	bb

Fill in this square on your paper and give the genotypes, phenotypes and their ratios.



Geno: BB, Bb, bb (1:2:1) or 25%, 50%, 25%
Pheno: Black, White (3:1) or 75% to 25%

	B	b
B	BB	Bb
b	Bb	bb


guy & rOdd 9-06
THINK ABOUT IT SANTOSO, IF WE CAN JUST GET THEM TO BREED, WE CAN PLAY TIC-TAC-TOE ALL DAY LONG!
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No-Fail steps to working a Punnett square!

- 1. Make a key of genotypes
- 2. Add phenotypes
- 3. Draw Punnett square
- 4. Get parent cross
- 5. Work square. ☺

- In cats, long tails are dominant over short tails. Cross one heterozygous long tailed cat with a short tailed cat. What is the chance there will be a short tailed cat born?

- Step One: Make a key:

LL –

Ll –

ll -

- In cats, long tails are dominant over short tails. Cross one heterozygous long tailed cat with a short tailed cat. What is the chance there will be a short tailed cat born?

- Step Two: Add the phenotypes!

LL – Long tail

Ll – Long tail

ll - Short tail

- In cats, long tails are dominant over short tails. Cross one heterozygous long tailed cat with a short tailed cat. What is the chance there will be a short tailed cat born?

- Step Three: Get parent cross

LL – Long tail

Ll – Long tail

ll - Short tail

Get the parent cross = Ll X ll

(heterozygous long and short)

- In cats, long tails are dominant over short tails. Cross one heterozygous long tailed cat with a short tailed cat. What is the chance there will be a short tailed cat born?

- Step Four: Work square

	L	l
l	Ll	l l
l	Ll	l l

What is the chance there will be a short tailed cat?

- In cats, long tails are dominant over short tails. Cross one heterozygous long tailed cat with a short tailed cat. What is the chance there will be a short tailed cat born?

- Step Four: Work square

	L	l
l	Ll	l l
l	Ll	l l

What is the chance there will be a short tailed cat? 50%

Determine the parent alleles:

- Homozygous short tail male with a homozygous long tail female: _____X_____
- Heterozygous Long tail male and female: _____X_____
- Two short tailed cats: _____X_____
- **<u>Challenge</u>**: Two long tailed cats that can have a short tailed kitten: _____X_____

off the mark.com by Mark Parisi