# PROBABILITY

Mendel realized that the principles of probability could be used to explain results of genetic crosses.


- **<u>Probability</u>:** the likelihood that a particular event will occur.
  - Flipping a coin: heads up or tails up. (Equal probability).
  - <u>50%</u> chance it will be heads. <u>50%</u> chance it will be tails.

# CALCULATING PROBABILITY

- If you flip a  coin 3 times, what is the chance it will land heads up all three times?
- Multiply the probability of each flip.

$$\underset{\text{1st flip}}{\frac{1}{2}} \; x \; \underset{\text{2nd flip}}{\frac{1}{2}} \; x \; \underset{\text{3rd flip}}{\frac{1}{2}} = \frac{1}{8}$$

# Probability and Genetic Variation

- Each time your parents “flip a coin” and have a baby, they have a certain probability of passing on a trait.
- Since each gene is passed down independently, this leads to genetic variation in two offspring of the same parents.
- Don’t forget about crossing over!  This increases genetic variation amongst offspring as well!

***Crossing Over:***
*Happens during Meiosis*

# Probability and Genetic Variation

- What are the odds a set of parents will have 4 girls in a row?

- What are the odds a set of parents who already have 4 boys, will have another boy the next time?

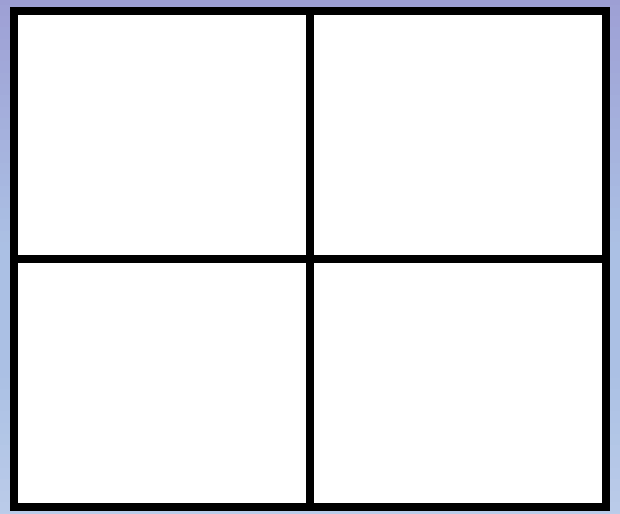
# PUNNETT SQUARES

- Take the alleles of the parent plants (TT and tt) and put them on the sides of the Punnett Square.
- Separate the gametes into the boxes.
- What do the F1 plants look like? Tall or short?

| | t | t |
|---|---|---|
| T | Tt | Tt |
| T | Tt | Tt |

# UNNETT SQUARE PRACTICE

Two $F_1$ plants are crossbred (**Gg x Gg**). Make a punnett square showing their offspring.

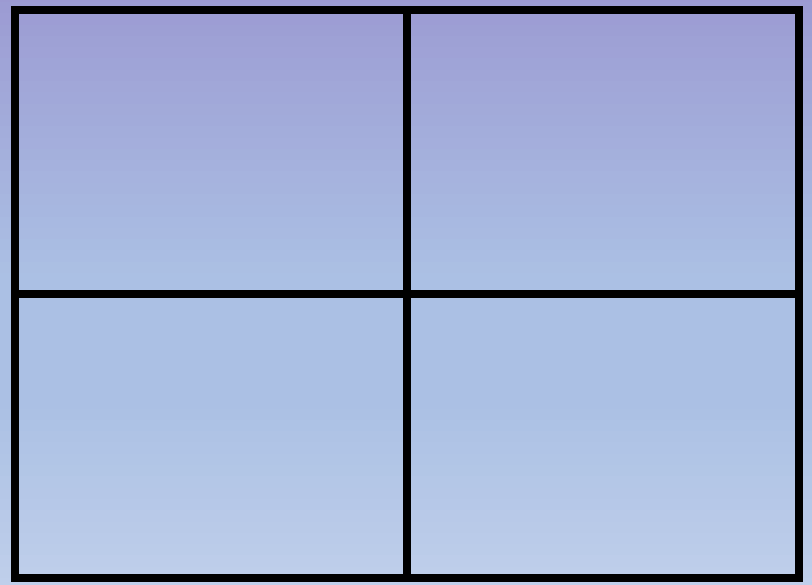


Two parental plants are crossbred (**RR x rr**). Show what the F1 generation looks like.

# $F_1$ CROSS PUNNETT SQUARE ANALYSIS

What are the genotypes for two tall F1 plants?

Complete a Punnett Square to cross the two F1 plants:



How many of the 4 F2 offspring will be tall?

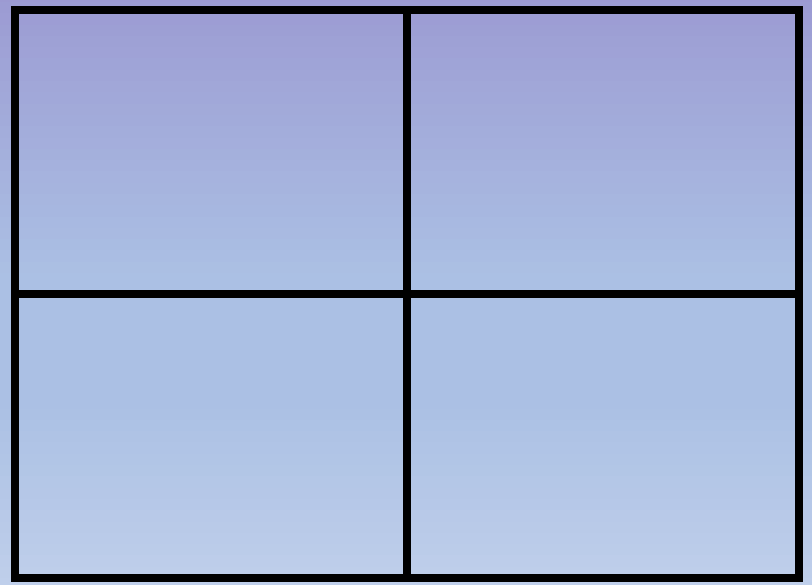
What three genotypes are present?

What is the ratio of tall to short offspring?

What is the ratio of the genotypes?

# PUNNETT SQUARE ANALYSIS

**Long (L) is dominant over short (l). Cross a Heterozygous parent with a short parent.**



What are the parents genotypes?

What are the parents phenotypes?

What is the phenotypic ratio of the offspring?

What is the genotypic ratio of the offspring?

# TEST CROSS

If I catch a moth in the wild, how could I figure out what its Genotype is?