

DIHYBRID

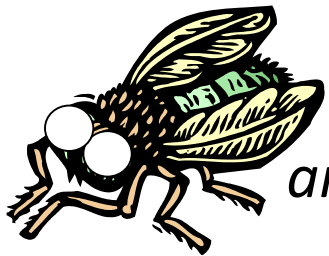
CROSSES

# But first ... Review of Monohybrid Crosses

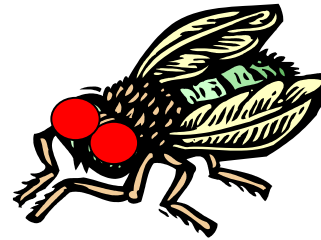
	Term	Definition	Example									
1	Allele	The version of the gene that is passed on to offspring, represented by a uppercase or lowercase letter.	A or a									
2	Genotype	The combination of alleles that an individual has for a particular trait. Represented by a pair of letters.	AA, Aa, or aa									
3	Phenotype	The physical expression of an individual's genotype.	The physical trait that appears, such as "blue eyes" or "cleft chin."									
4	Gamete	Sex cells (sperm or eggs). These contain half of the genetic information, therefore half of the alleles of each trait.	If an individual had a genotype of Aa, then the gametes they could produce would either contain the "A" allele or the "a" allele.									
5	Dominant	A trait, represented by an uppercase letter, that is ALWAYS expressed when present in the genotype.	Dominant traits would be expressed by individuals with genotypes AA or Aa.									
6	Recessive	A trait, represented by a lowercase letter, that is ONLY expressed when the dominant allele is absent.	Recessive traits would be expressed by individuals with the genotype aa.									
7	Heterozygous	The genotype of the individual consists of both dominant and recessive alleles	Aa									
8	Homozygous	The genotype consists of either both dominant or both recessive alleles.	Homozygous dominant: AA Homozygous recessive: aa									
9	Probability	The number of times a certain thing will happen divided by the total possible outcomes.	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>A</td> <td>a</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> </table> <p>For the punnett square above the probability of getting a heterozygous offspring is (2/4) or 50%</p>		A	a	a	Aa	aa	a	Aa	aa
	A	a										
a	Aa	aa										
a	Aa	aa										
10	Ratio	There are genotype and phenotype ratios. These are the comparisons between all the different possible offspring. You must label the numbers you are comparing.	<table style="margin-left: auto; margin-right: auto;"> <tr> <td></td> <td>A</td> <td>a</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> <tr> <td>a</td> <td>Aa</td> <td>aa</td> </tr> </table> <p>For the punnett square above the genotype ratio would be: 2Aa : 2aa</p>		A	a	a	Aa	aa	a	Aa	aa
	A	a										
a	Aa	aa										
a	Aa	aa										

# Review of Monohybrid Crosses

- Remember, monohybrid crosses involve only ONE trait (mono = one)
- Practice... **In fruit flies, red eyes are dominant over white eyes.**
  - Cross a white-eyed fly with a homozygous dominant red-eyed fly.
  - Cross two heterozygous red-eyed flies.

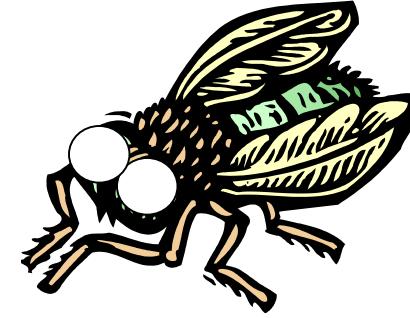


*Draw a Punnett square for each cross,  
and determine the genotypic and phenotypic ratios.*

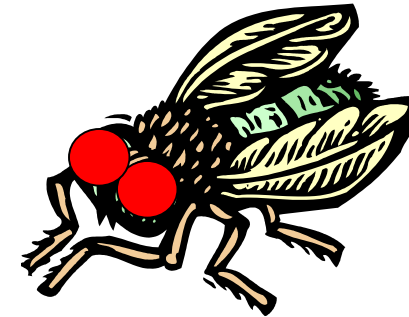


# *Review of Monohybrid Crosses*

- Can you determine the genotype of a white-eyed fly just by looking at it?



- Can you determine the genotype of a red-eyed fly just by looking at it?



- How could you determine the genotype of the red-eyed fly?

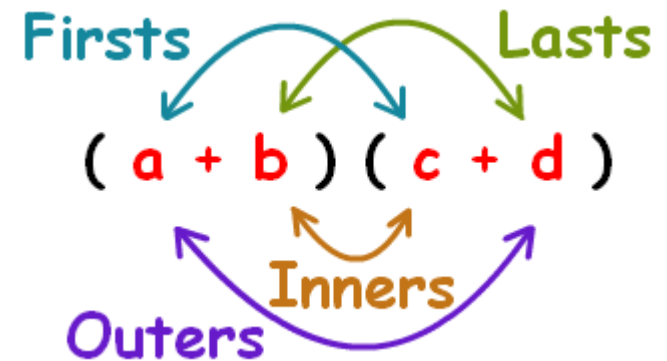
# Dihybrid Cross

- a 4x4 representation of crossing TWO traits
- monohybrid = 1 trait w/ 2 alleles  
= 1 allele gamete each for 2x2 box
- dihybrid = 2 traits w/ 2 alleles EACH = 4 alleles  
= 2 allele gametes each for 4x4 box  
[one allele for each trait in each gamete]

# Solving a Dihybrid

- Determine the genotypes of each parent
  - Given to you, you assign, or you have to solve for them
- Given: Parent #1 AABB
- Given: Parent #2 aabb

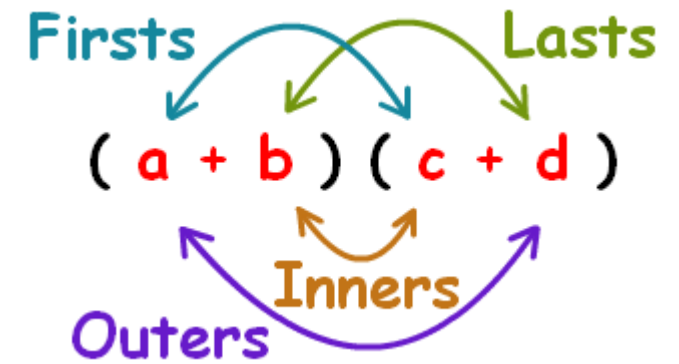
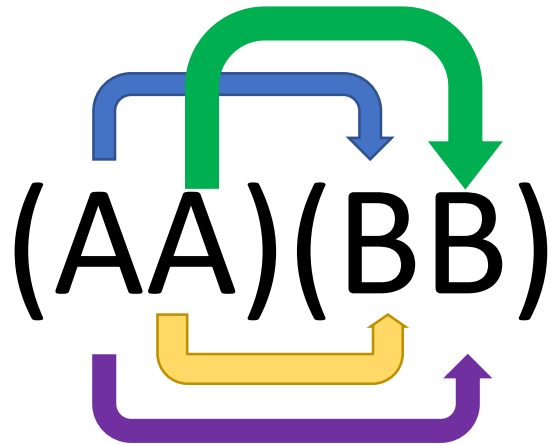
- Remember... Gregor Mendel was the first to use MATH in terms of biology.
- When solving Dihybrid Crosses we will use a math-method called FOIL



# Solving a Dihybrid

- Create your dihybrid cross [4x4]
- FOIL Dad's Traits

Parent #1 AABB



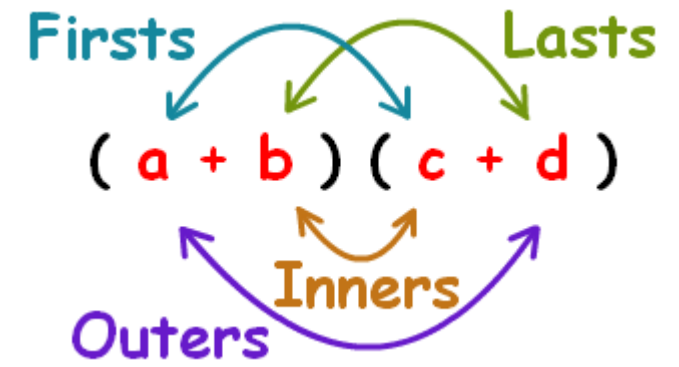
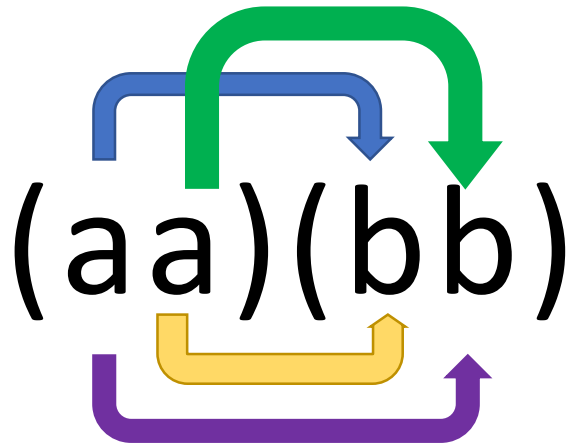
AB AB AB AB

AB	AB	AB	AB

# Solving a Dihybrid

- Create your dihybrid cross [4x4]
- FOIL Momma's Traits

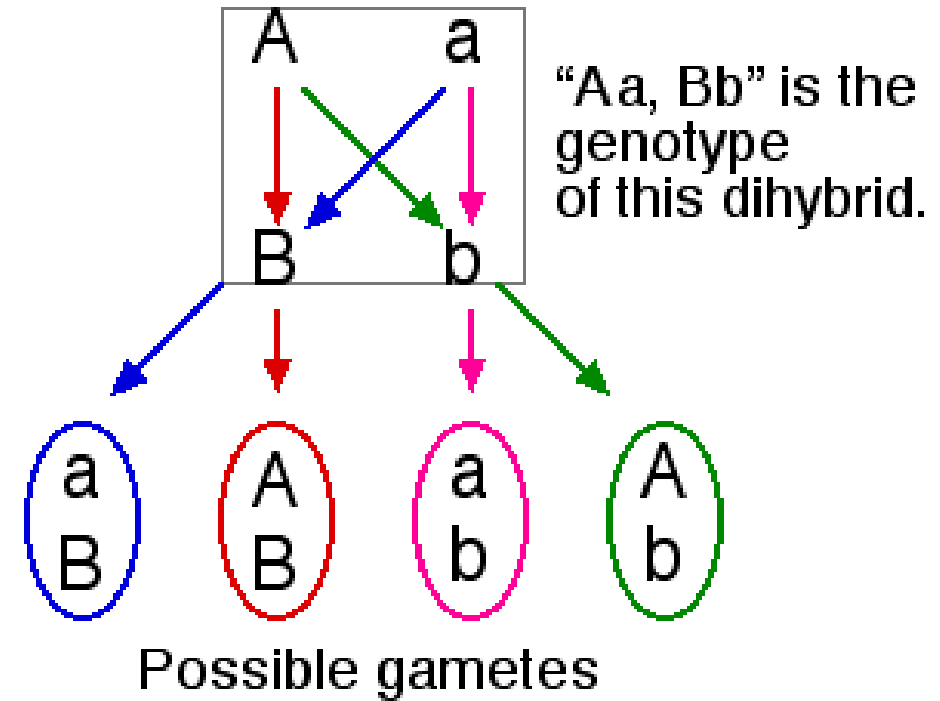
Parent #1 aabb



	AB	AB	AB	AB
ab				
ab				
ab				
ab				

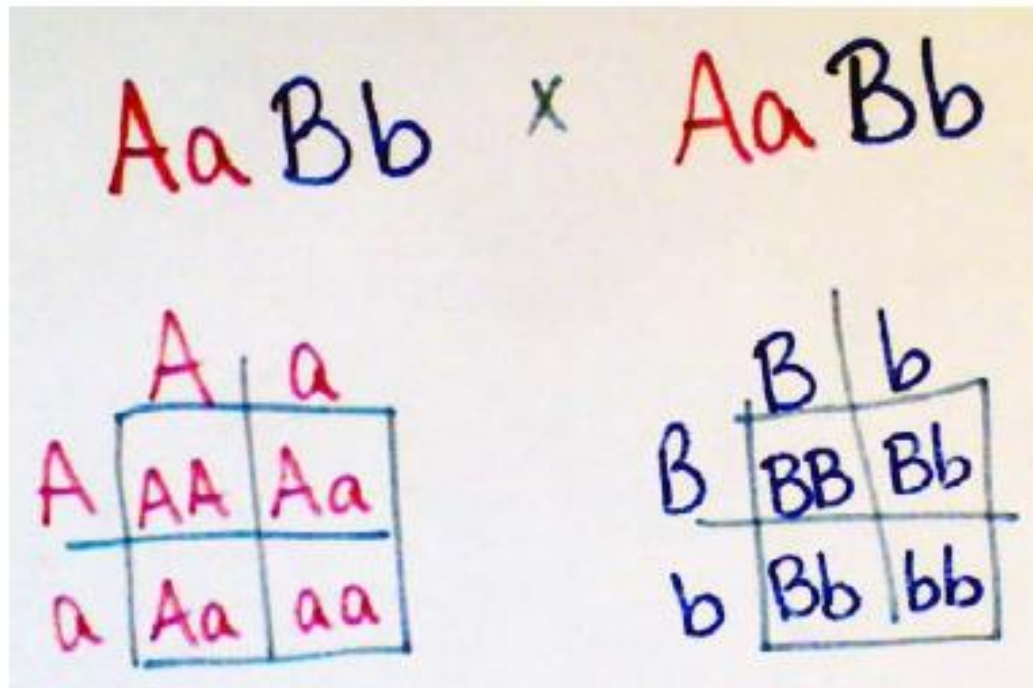


- IF YOU DON'T LIKE **FOIL** you can use the "box method"
- Find the possible gametes and then insert them into a dihybrid cross per usual!



# Method TWO

- ✓ For this method, you don't need to find the possible allele combinations.
- ✓ Separate the traits and complete small Punnett squares for each.
- Ex. The parent genotypes are **AaBb** x **AaBb**



- ✓ Now you use the information from the small squares to calculate the probability for each possibility (answer the question ☺)

Chance of aabb offspring?

$$aa \times bb$$
$$\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$$

- ✓ You can also multiply the %...  $25\% \times 25\% = 6.25\%$   
 $0.25 \times 0.25 = 0.0625$
- ✓ Calculate each possibility

As you can see, either method will give you the same correct answer! Try them both & decide which you prefer to use!!