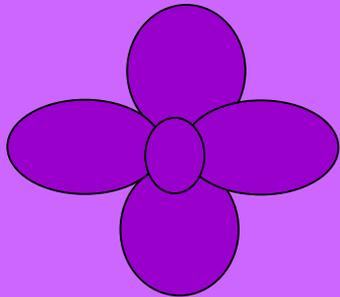


Non-Mendelian Genetics

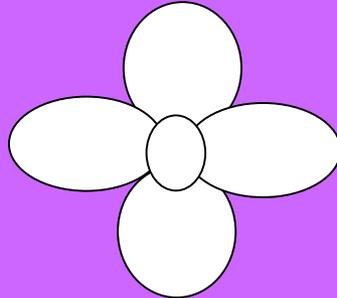
Mendelian Genetics: Review

- ❖ One allele is **DOMINANT** over the other
- ❖ One allele is **RECESSIVE** (only seen when dominant allele is **NOT** present)
- ❖ Example – Purple flowers are dominant (F) to White (f).
What are the Genotypes and Phenotypes?

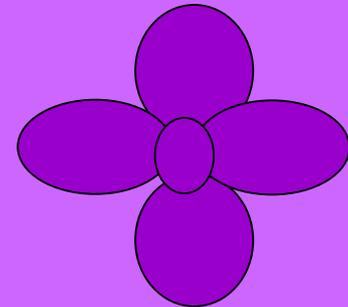
genotype: FF
phenotype: purple



genotype: ff
phenotype: white



genotype: Ff
phenotype: purple



Review Problem:

Dominant & Recessive

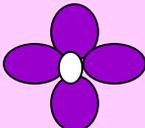
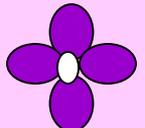
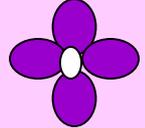
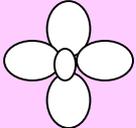
- ❖ In pea plants, purple flowers (F) are dominant over white flowers (f). Show the cross between two heterozygous plants. Determine the genotypes & phenotypes.

GENOTYPES:

- FF (25%)
- Ff (50%)
- ff (25%)
- ratio 1:2:1

PHENOTYPES:

- purple (75%)
- white (25%)
- ratio 3:1

	F	f
F	 FF	 Ff
f	 Ff	 ff

Non-Mendelian Genetics

- ❖ Incomplete Dominance
- ❖ Codominance
- ❖ Multiple Alleles
- ❖ Polygenic Traits
- ❖ Sex-Linked Traits

Incomplete Dominance

- ❖ a third (new) phenotype appears in the heterozygous condition as a BLEND of the dominant and recessive phenotypes.

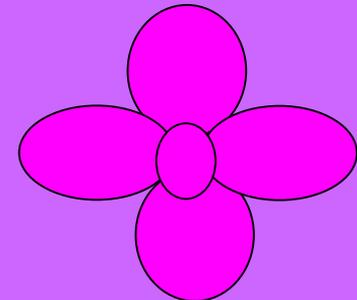
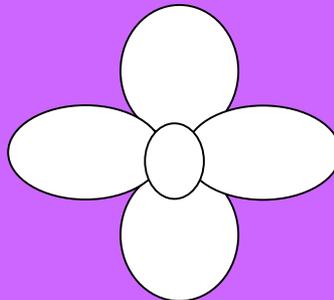
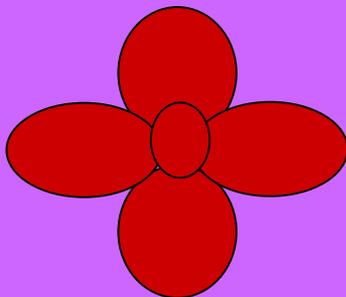


- ❖ Ex - Dominant Red (R) + Recessive White (r) = Hybrid Pink (Rr) What are the genotypes & phenotypes?

RR = red

rr = white

Rr = pink



Problem:

Incomplete Dominance

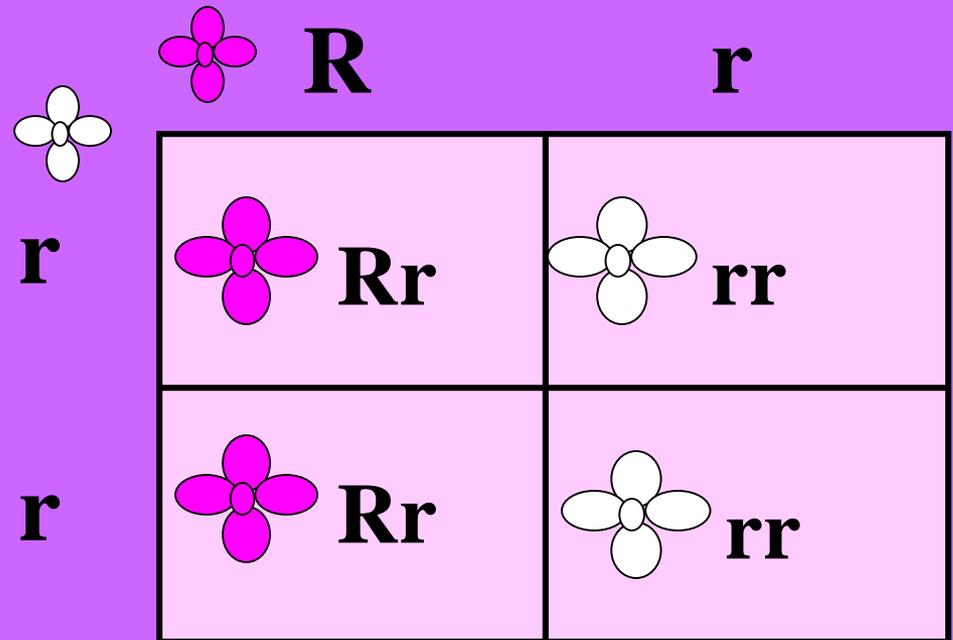
- ❖ Show the cross between a pink and a white flower.
Determine the genotypes & phenotypes.

GENOTYPES:

- RR (0%)
- Rr (50%)
- rr (50%)
- ratio 1:1

PHENOTYPES:

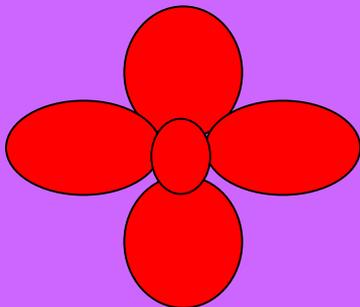
- pink (50%); white (50%)
- ratio 1:1



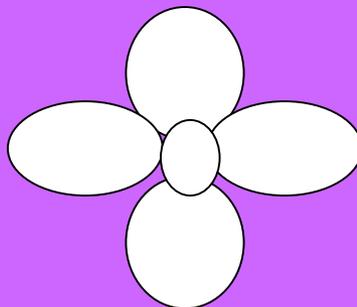
Codominance

- ❖ in the heterozygous condition, both alleles are expressed equally with NO blending!
- ❖ Example: Ex - Dominant Red (R) + Recessive White (r) = Hybrid Red/White (Rr)

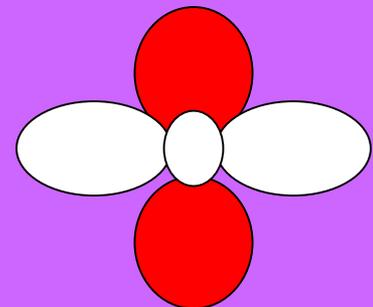
RR = red



rr = white



Rr = Red/White



Codominance Problem : Speckled Chickens

Show a cross between two heterozygous chickens

❖ BB = black feathers

❖ bb = white feathers

❖ Bb = black & white speckled feathers



GENOTYPES:

- BB (25%)

Bb (50%)

bb (25%)

- ratio 1:2:1

PHENOTYPES:

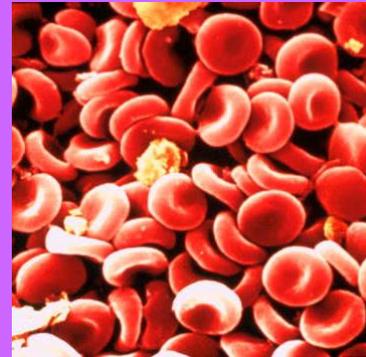
- black (25%); white (25%)

- Black/white (50%) ratio 1:2:1

	B	b
B	BB	Bb
b	Bb	bb

Multiple Alleles

- ❖ there are more than two alleles for a gene.
- ❖ Ex – blood type
 - ❖ A humans blood type is determined by a single gene that has three different alleles.
 - ❖ Blood types are A, B, O, and AB.
 - ❖ AB blood is a co-dominant trait.
 - ❖ Both the A blood and the B blood need to be dominant in order to make a combination of co-dominant blood types, which is AB.



Blood Type	Genotype		Can Receive Blood From:
A	$i^A i$ $i^A i^A$	AA AO	A or O
B	$i^B i$ $i^B i^B$	BB BO	B or O
AB	$i^A i^B$	AB	A, B, AB, O
O	ii	OO	O

Problem: Multiple Alleles

- A woman with Type O blood and a man who is Type AB are expecting a child. What are the possible blood types of the kid?

	I^A	I^B
i	$I^A i$	$I^B i$
i	$I^A i$	$I^B i$

50% = heterozygous with blood Type A
50% = heterozygous with blood Type B

Polygenic Traits

- ❖ traits produced by multiple genes
- ❖ example: skin color, eye color, height

