First Things First

Find out about

Incomplete dominance and **Codominant** Patterns of Inheritance

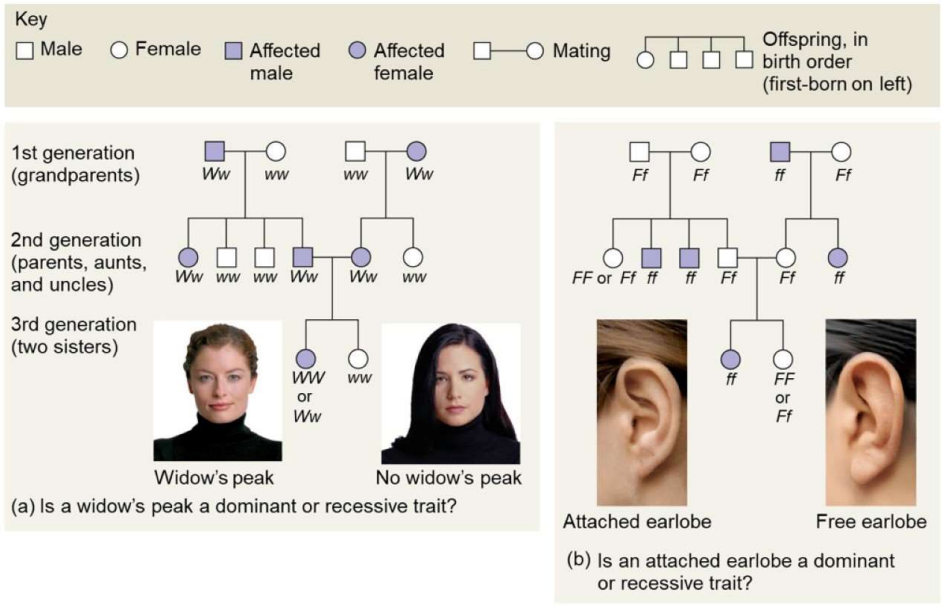
Fill out these rows in the table ON YOUR ANSWER SHEET

You can fill in the following rows after you've learned about them from the slides.

You will see that control of ABO blood type falls into 2 (actually, 3) categories

Type of Inheritance pattern Relationship among alleles of a single gene	Description of how the alleles in a heterozygote interact and what the phenotype will be (in general)	Example and ow alleles are named
Simple Mendelian Inheritance (Dom/recc) Complete dominance of one allele	Heterozygous phenotype same as that of homozygous dominant	*PP*  *Pp* 
Incomplete dominance of either allele		
Codominance		
Multiple alleles/ polyallelic inheritance		ABO blood group alleles
Pleiotropy	One gene affects multiple phenotypic characters	Sickle-cell disease Cystic fibrosis

Pedigree charts: *guessing the genotypes from the phenotypes*



Draw a Pedigree Chart in the space below

Show three generations of your family. Start with both sets of grand parents. Pick one phenotype for a given characteristic and make that Dominant. Make all the other versions of that Characteristic recessive. Please don't pick a characteristic that is the same in every family member for generations back!

Good examples: height, waviness of hair, weight, sciences vs. arts

Bad examples: someone from England picking bad vs. good teeth (they're all bad!)

Use the shaded shapes to show phenotype and put possible genotypes under those. You might need to ask your parents to tell about some of your relatives.

Within a given population there is usually one allele present, maybe two for a given gene – especially if it encodes something very important for survival.

For example, the vast majority of people have only one allele (HB) for the gene that encodes a nice healthy Hemoglobin protein – the oxygen carrying red pigment in blood cells). They are *homozygous* HBHB.
A very few people carry a second, unhealthy allele, the sickle cell allele (HB^S)
These people are either very sick, because they are homozygous for the HB^S allele: HB^SHB^S or they have milder disease if they heterozygous for the allele. HB^SHB
- *We learned about this last term*

Poly allelic inheritance/ multiple alleles

For many other genes there are multiple different alleles present in a population. Especially for those genes that encode proteins that control characteristics that can be variable without harming an individual. Remember though, that one person can only ever have a maximum of two different alleles for a given gene locus.

For example; the ABO blood type gene has three different alleles, but a individual can only be homozygous for one allele or have two different alleles (heterozygous). All the different alleles will interact differently. Some might be Dominant over others, some might be co-dominant and some might be incompletely dominant → a lot of possible phenotypes

There is separate set of slides all about this

Polygenic Inheritance

Many, many characteristics and their observable phenotypes in humans (and dogs!) are controlled by the alleles of more than one gene.

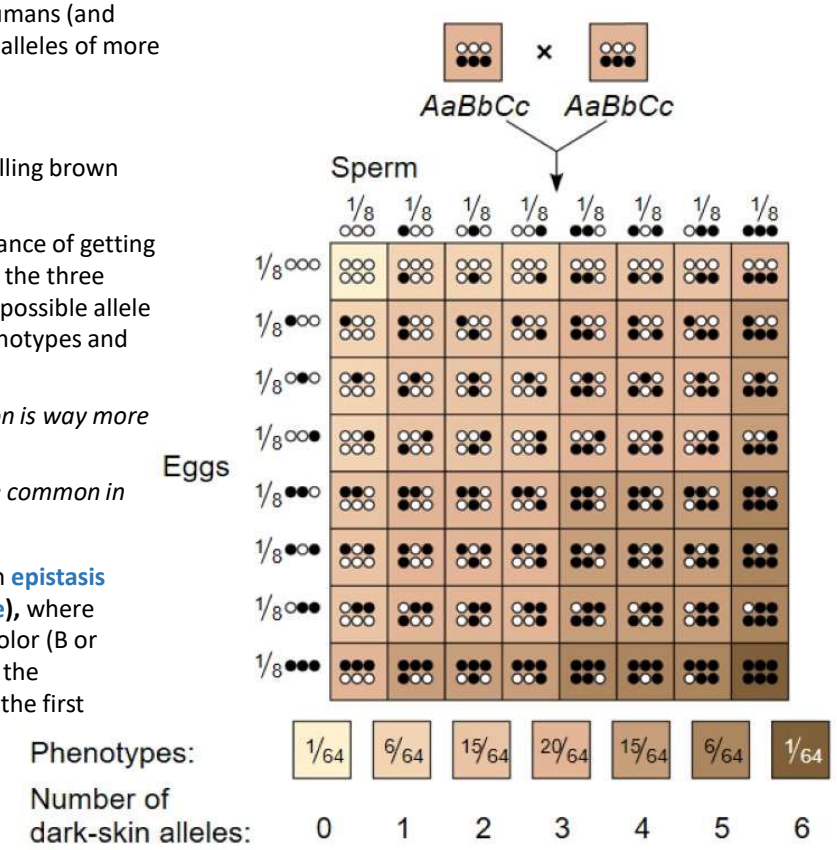
For example: skin color

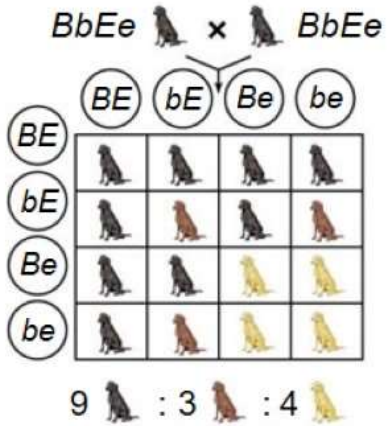
With just three genes controlling brown pigment.

If each gamete has a 50% chance of getting one of the alleles for each of the three genes, we end up with eight possible allele genotypes, 64 possible F_1 genotypes and <u>seven different phenotypes!</u>

- *Obviously the real situation is way more complicated than this!*
- *Also, some alleles ar more common in different populations*

We also learned about this in **epistasis in dog coat colors (next slide),** where one gene controls pigment color (B or b) and one controls whether the pigment can be laid down in the first place



Relationship among two or more genes	Description	Example
Epistasis	The phenotypic expression of one gene affects the expression of another gene	
Polygenic inheritance	A single phenotypic character is affected by two or more genes