Codominance

- Both alleles are expressed in the heterozygous form
  - Example: blood type
  - Human blood types – there are four
    - A – only express the A type – dominant (AO, AA)
    - B – only express the B type – dominant (BO, BB)
    - **AB – express BOTH A AND B – codominant (AB)**
    - O – have neither A or B (recessive OO)
- Let's cross a male parent with AO with a female parent with BO blood
  - What type of blood with the offspring have?

Codominance

	A	O
B	**AB** **Type AB - codominant**	**BO** **Type B – B dominant**
O	AO Type A – A dominant	OO Type O – recessive (No A or B!)

Codominance

▸ **This is why certain blood types can donate to some but not others!**

  ▸ If you donate blood to someone who doesn't have your alleles, there is a clotting problem

  ▸ If blood clots too much, the person can die

Type	Donate to	Cannot receive from
A (AO)	A and O	B or AB
B (BO)	B and O	A or AB
AB (AB)	AB	Can receive from all
O	Can donate to all	A, B, AB

▸

Codominance

- Sickle-Cell disease
  - Codominant disorder
  - The allele responsible is prevalent in the African American population and descendants
  - Roughly 9% of the African American population has one form of the trait

- Affects blood cells and the ability to carry oxygen
- The trait will appear differently depending on the combination
  - 1 normal blood cell trait + 1 sickle cell trait = still normal but carry the trait (will have sickle cells + normal cells)
    - Can pass on the sickle cell trait to offspring
  - 2 sickle cell traits = sickle cell anemia

Multiple Alleles

- Example: Coat color in rabbits
- In rabbits, four alleles code for coat color
  - C, c^{ch}, c^h, and c
- Allele C is dominant to all other alleles
  - Results in a full color coat
- Allele c is recessive
  - Results in albino color coat
- Allele c^{ch} is dominant to c^h
  - Results in Chinchilla coat
- Allele c^h is dominant to c
  - Results in Himalayan coat

Multiple Alleles

Phenotype	Allele	Possible Genotypes	Order of Dominance
Full color (brown)	C (capital C)	CC Cc^{ch} Cc^h Cc	Dominant over all others
Chinchilla	c^{ch} (lowercase c with ch superscript)	$c^{ch}c^{ch}$ $c^{ch}c^h$ $c^{ch}c$	Dominant over Himalayan and albino
Himalayan	c^h (lowercase c with h superscript)	c^hc^h c^hc	Dominant over albino
Albino	c (lowercase c)	cc	Recessive to all others