Warm-up: Are these examples of incomplete dominance or codominance?

Codominance

Incomplete Dominance

Multiple Alleles

- Genes that have more than two alleles
  - Individuals cannot have more than two alleles
  - It means that more than two alleles for a gene exist in the population

  - E.g. Blood type

Blood Type

- There are three alleles for the blood type gene:
  - I^A
  - I^B
  - *i*

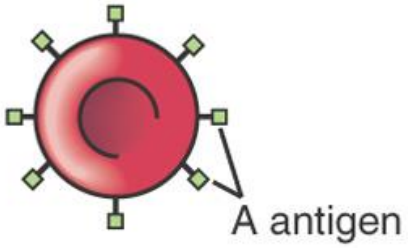
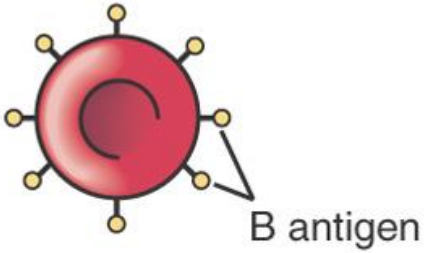
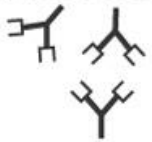
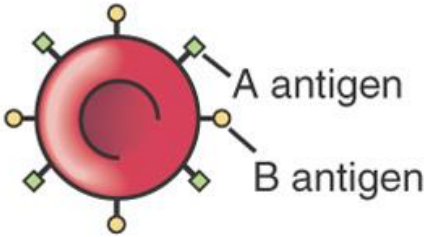
- A and B are <u>codominant</u>
- Lowercase *i* is used for the 3rd allele because it is recessive when expressed with A or B.
- These alleles produce <u>antigens</u> on the surface of red blood cells

Possible blood genotypes

Phenotype	Genotype
O	ii
A	I^AI^A or I^Ai
B	I^BI^B or I^Bi
AB	I^AI^B

Universal Recipient

Universal Donor

Blood Type	Antigen (RBC membrane)	Antibody (plasma)	Can receive blood from	Can donate blood to
A (40%)		Anti-B antibodies 	A, O	A, AB
B (10%)		Anti-A antibodies 	B, O	B, AB
AB (4%)		No antibodies	A, B, AB, O	AB
O (46%)	 No antigen	Both Anti-A and Anti-B antibodies 	O	O, A, B, AB

Example 1: If a woman with type O blood and a man with type AB blood have children, what are the possible genotypes?

Example 2: Is it possible for a person with blood type allele I^A and I^B to have blood type A?

Polygenic Inheritance

- Traits controlled by two or more genes to shape a single phenotype
- Polygenic traits show a wide-range of phenotypes

- E.g. height of humans – not just tall or short, have a wide range
- E.g. Human skin color – not just black or white

Eye color is technically polygenic!

- However – you need to know that, generally:

  Brown eyes are DOMINANT

  Blue eyes are RECESSIVE

Example 1: What is the chance that a man with blue eyes and a woman who is heterozygous for brown eyes will have a child with brown eyes?

Example 2: What is the chance that a man who is heterozygous for brown eyes and a woman who is heterozygous for brown eyes will have a child with blue eyes?