

GENETICS

LESSON 7: OTHER PATTERNS OF INHERITANCE

Learning Outcomes

- I can distinguish between co-dominance, incomplete dominance, multiple-allele, and polygenic traits.
- I can use a Punnett square to determine the probability of genotypes and/or phenotypes for co-dominance, incomplete dominance and multiple allele traits.

Co-Dominance

- results when different alleles for the same trait are present in different parts of the organism
- examples: hair colour of calico cats, flowers with different colours on the petals

Incomplete Dominance

- results when the phenotype of heterozygous individuals is a blending of the dominant and recessive traits
- examples: white and red carnations produce pink carnations

Multiple-Allele Traits

- a trait for which there is more than two alleles occurring at the same gene location on a chromosome
- Example: blood typing (3 different alleles)

<u>Blood Type</u>	<u>Genotype</u>	<u>Phenotype</u>
A	$I^A I^A$ or $I^A i$	Type A Blood
B	$I^B I^B$ or $I^B i$	Type B Blood
AB	$I^A I^B$	Type AB Blood
O	ii	Type O Blood

- blood type can be dominant/recessive ($I^A i$ or ii) or codominant ($I^A I^B$)
- in addition to this, blood is also listed as Rh positive or negative
 - Rh is an autosomal trait (i.e., Mendelian)

Polygenetic Traits – traits that are controlled by multiple genes.

- Eye colour
 - two genes (OCA2 and HERC2) on chromosome 15 have a major role in eye colour – these produce and regulate the amount of melanin (pigmentation) in the iris
 - less melanin = lighter (blue) eyes

- more melanin = darker eyes (brown)
- an additional 14 other genes have minor roles in determining smaller variations in eye colour (ex: shades of blue)

Blood type video

<https://www.youtube.com/watch?v=L06TJTMVkBo>

