

Part C: Genes and Inheritance

Mendelian Genetics:

- His original findings: a heritable unit (gene) is passed on from one generation to the next and it can have alternate forms (alleles); each individual must have two of these alternate forms per feature; sex cells only have one alternate form per feature; one allele can be dominant over the other.
- Most features of the pea plants Mendel studied only had two alternate forms and there were no intermediate forms.
- Mendel transferred pollen from one plant to another, referred to as the *P* generation. He then collected all the seeds produced by the *P* generation and allowed them to self-fertilize after noting all their features. This was the *F1* generation. The offspring of these self-fertilized plants formed the *F2* generation of pea plants.
- Mendel noticed some similarities in his studies: all plants of the *F1* generation were always of just one type and this type was not a blend of the two parental features, and there was always a 3:1 ratio in the *F2* generation.
- Modern-day explanation of Mendel's results:
 - Each feature is controlled by a gene in a chromosome.
 - There are two copies of each chromosome in all somatic cells.
 - Sex cells only have one copy of each chromosome.
 - There are two alleles (at least) of each gene.
 - One allele is dominant over the other.
 - When the alleles are heterozygous, the dominant allele is expressed.

Codominance:

- Complete dominance: one allele completely masks the effect of the recessive allele.
- If two alleles are expressed in the same phenotype they are codominant.
 - ❖ Snapdragon plants have red, white, or pink flowers. The pink flower is a result of a heterozygous genotype Red-White.
- Most genes do not show complete dominance.

Sex Determination:

- Our sex is determined by the X and Y chromosomes, specifically the presence or absence of the Y chromosome.
- The gender of a zygote essentially depends on if the sperm cell carries an X chromosome or a Y chromosome, since all egg cells carry X chromosomes.
- The Y chromosome is sometimes described as dominant but this is not true because dominance only applies to alleles.
- The overall ratio of male and female births is 1:1 but this ratio is not always met.