

Year 10 Biology Unit Two: Variation

This topic is about reproduction in plants and animals. It also includes NCEA Level 1 Achievement Standard 1.9: Genetics, a more amped up version of the Genetics covered alongside the Variation topic. It covers the basics; how plants reproduce, how animals reproduce, and sexual and asexual reproduction.

Variation Module

Reproduction

Reproduction ensures the survival of a species (maintains life). There are two types of reproduction:

- Sexual Reproduction
- Asexual Reproduction
- Sexual Reproduction
- Two individuals are needed.
- They both produce sex cells, that fuse on fertilization
- However, energy is needed, and wasted, finding a mate.
- Eg. Humans
- Asexual Reproduction
- Involves only one organism
- One organism can produce offspring by itself
- The offspring are always identical to the parents
- Eg. Bacteria

Reproduction in Humans

Humans and large animals are only able to reproduce by sexual reproduction. The male gamete is the sex cell that moves to the female gamete (which stays in one place). In humans, an individual is either male or female. The male makes the male gamete or sperm, and the female makes the female gamete, or egg.

Reproductive Organs

Male:

- Penis
- Testes
- Epididymis
- Sperm duct
- Scrotum
- Urethra

Female:

- Fallopian tube
- Ovary
- Oviduct
- Uterus
- Cervix
- Vagina

Fertilization is when the sperm from the male meets the egg from the female in the Fallopian tube. Ovulation occurs in the ovaries, when eggs are released into the uterus.

Reproduction in Plants

You already learnt Parts of Plants in Year 9, so I won't go into it too far. It's most likely not on this site. Tough cumquats, we can't give you everything. Pretty much, when a plant is fertilised, the pollen of said plant has either travelled from its own anther to its own stigma (self pollination), or to another flower's stigma. This can be done in any of three ways: by animals, by the wind, and by mechanisms within the plant that flick them out. This is to ensure the survival of the plants.

Pollination and Fertilisation

A pollen tube then grows down to join the egg in the ovary, and fertilisation is when the two join, forming the new plant. This is also the key difference between the two. This is HUGE! Important part of this topic.

Life Cycles

Other animals also undergo life cycles. However, insects and amphibians undergo a process called metamorphosis, which means to change. There are two types of metamorphosis; incomplete metamorphosis and complete metamorphosis. There are three main creature cycles you must know; the Mosquito, the Frog and Butterfly.

Butterfly (Complete)	Frog (incomplete)	Mosquito (Complete)
Egg ↓ Caterpillar ↓ Chrysalis ↓ Butterfly	Egg ↓ Tadpole ↓ Frog	Egg ↓ Larva ↓ Pupa ↓ Mosquito

NCEA Level 1 Science: 1.9 - Genetics

This unit is based on Achievement standard Science 1.9 of NCEA level one. It has been simplified and should be studied along with the Year 9 unit. This unit includes...

- DNA
- Reproduction
- Inheritance
- Variation

What is Genetics?

Genetics is what makes people unique, it controls people characteristics, their looks, how their bodies function.

Jargon

Here are some words you will come across in this unit. Familiarize yourself with them...

- Allele - One form of a Gene. Each characteristic has two genes.
- DNA - Deoxyribose Nucleic acid. The Genetic code.
- Double Helix - A word describing the structure of DNA.
- Egg - The female sex cell, which is fertilized by the sperm.
- Gamete - A sex cell Egg and Sperm in animals.
- Gene - A strip of DNA coding one particular feature.
- Heterozygous - Having two different Alleles for a single gene.
- Homozygous - Having two identical Alleles for a single gene.
- Inheritance - The passing of characteristics on from generation to generation through DNA.
- Meiosis - Cell reproduction producing Gametes.
- Mitosis - Cell reproduction producing two identical offspring cells.
- Mutation - Random change in genetic code.
- Nucleotide - A molecule which makes up DNA.
- Punnett Square - Diagram showing probabilities of inheriting different characteristics.
- Sexual Reproduction - Reproduction using the fusion of Gametes from two parents to create an offspring.
- Sperm - The male sex cell, required for fertilisation of an egg.
- Triplet - Sequence of three bases (A,T,C,G) found on a DNA strand.
- Variation - A difference in genetic code.
- Zygote - A fertilized egg.

DNA

Deoxyribose Nucleic Acid more commonly known as DNA is the chemical code which is the 'instructions' for every aspect of an Organism. DNA is coded by the four Complementary Base Pairs (C.B.P's). Imagine DNA is a twisted ladder (this is called the double helix), if you straightened it out there would be the sides and the rungs. The rungs are made from the C.B.P's. A combination of two Bases (one on each side) held together by two or three hydrogen bonds (H bonds). The sides are made up of a Phosphate Group and a Deoxyribose Sugar (5 carbon sugar).

Introducing the C.B.P's

The C.B.P's are what make up the 'rungs' of the DNA. The C.B.P's are Adenine, Cytosine, Guanine, Thymine or A,C,T and G. Adenine will only bond with Thymine. You can remember this by grouping the Straights with each other. Cytosine will only bond with Guanine. You can remember this by grouping the Curves with each other. At NCEA Level one it is not necessary to know the names of the C.B.P's. The four possible combinations are listed in the table below (Fig. 1).

Base 1	Base 2	Hydrogen Bonds
Adenine	Thymine	3
Thymine	Adenine	3
Cytosine	Guanine	2
Guanine	Cytosine	2

Fig. 1 The four possible base combinations.

Cell Reproduction

Cell reproduction is what is expected to cope with New Zealand burgeoning population.

But seriously it is used to reproduce cell which enables organisms to grow. Meiosis produces sex cells with half the genetic code. Mitosis produces non sex cells with the full genetic code. You can remember this by realising Meiosis happens in your Ovaries (if you are a girl), Mitosis happens in your Toes and every other non sex cell.

Types of cells

There are two main types of cells Sex Cells (Gametes, say Gah-Meats) and Non sex cells (Sometes, say Soh-Meats).

Here are some examples below of each.

Sex Cells (Gametes)	Non Sex Cells (Sometes)
Egg Cell	Retina Cell
Sperm Cell	Skin Cell

Meiosis

Meiosis is the type of cell reproduction which produces ~~tadpoles and eggs~~ sperm and eggs, the male and female Gametes respectively.

Mitosis

So what's the difference?

There are differences between Meiosis and Mitosis. All types of cell reproduction are not equal.

Meiosis	Mitosis
Four Cells Produced	Two cells produced
Produces Gametes	Produces Sometes
Chromosomes line up in pairs	Chromosomes line up singularly