Genes, Chromosomes and DNA

11SCI - Genetics

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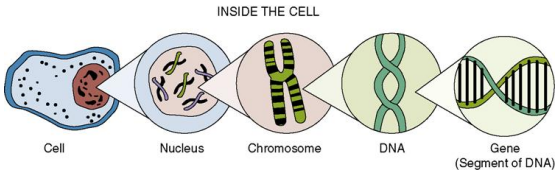
Learning Outcomes

- Understand the relationship between cells, nuclei, chromosomes, genes, alleles and DNA.
- Understand the role DNA plays in carrying instructions to the next generation and determining phenotype.

Think, pair and share what do you know about **DNA**, **genes**, **chromosomes**, **cells**, **nucleus**, **organisms** and can you put them in order of magnitude?

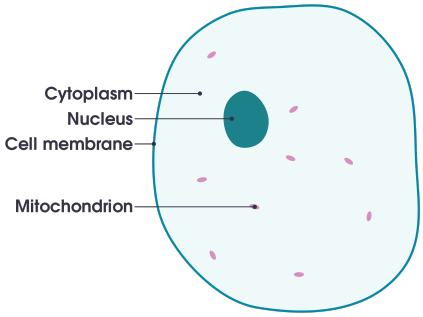
What are we made of?

Organisms are made of cells, each cell contains a nucleus, the nucleus contains chromosomes made up of DNA, and DNA contains many genes.



Cells

All organisms on Earth are made of one or more cells

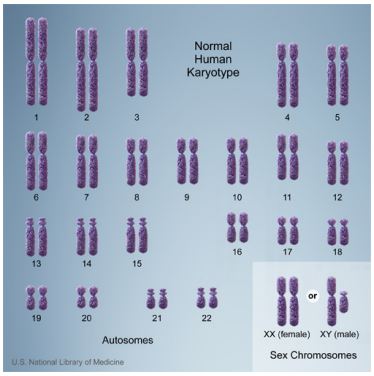


Nucleus

Inside each cell is a nucleus. The nucleus holds genome of the cell in the form of chromosomes.

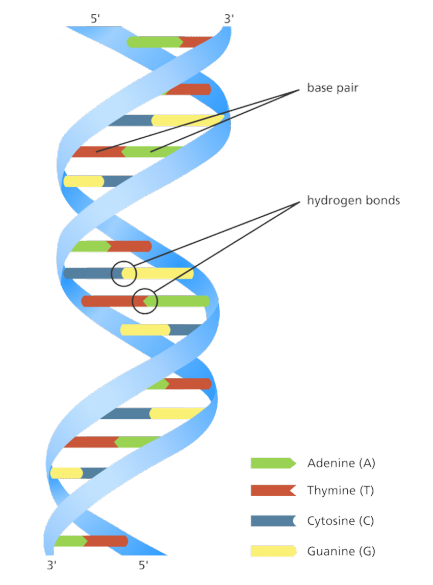
Chromosomes

Chromosomes are located inside the nucleus and are made up of long chains of DNA. Humans have 23 pairs of chromosomes, giving us 46 in total!



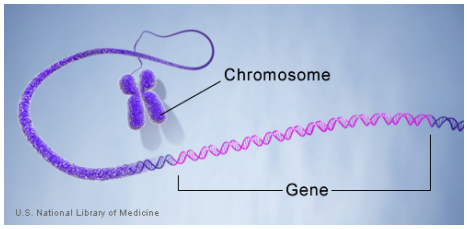
Deoxyribonucleic Acid (DNA)

DNA is a very long chain of *base pairs* which forms chromosomes.



Genes

A gene is a small segment of DNA made of *base pairs* and are what determine everything about us! Each chromosome carries **many** genes. Humans have around 25000 genes. That is a lot of genes per chromosome!



Alleles

Each gene has two **alleles**, one **allele** comes from each parent. E.g. brown hair from mum, blonde from dad.

Exercise: Building DNA!

sciPAD pages, cut out the DNA pieces and build some DNA and stick it on the previous page!

Starter: Review!

Discuss with the people around you and create a diagram relating cells, nuclei, DNA, chromosomes, DNA and alleles to each other. Try and do it without using your notes (but look if you need to!).

Allele

A gene has two alleles: one from each parent. The allele is on a chromosome and we call two chromosomes of the same shape a **homologous pair**.

Homozygous and Heterozygous

If you have two of the same allele (e.g. brown and brown) this is *homozygous*. If you have different alleles (e.g. brown and blue) this is *heterozygous*.

Genotype

The genetic make-up of an organism.

Structure of DNA

- Using our diagrams from page 8/9 in our sciPAD we can see that only certain shapes fit with other shapes in DNA. We call this **complementary base pairing**.
- Which bases pair with which bases and what are they called? Label them on your diagram!

Questions

Answer question 1 and 2 on page 9 of your sciPAD.