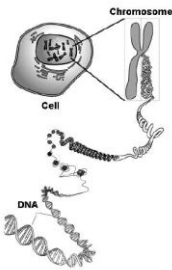


CHROMOSOMES, GENES AND DNA

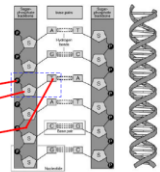
- A chromosome is essentially a **single DNA** molecule. Human somatic cells thus have 46 DNA molecules.



- DNA stands for "**deoxyribonucleic acid**", a term which describes the type of sugar (deoxyribose) and the location in the cell (nucleus).

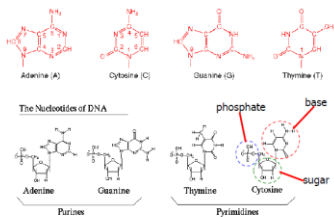
- The building blocks of DNA are "**nucleotides**" which are attached together like a twisted ladder to form a "**double helix**".

- Each nucleotide is composed of **three** parts:
 - phosphate group
 - deoxyribose sugar
 - nitrogenous base

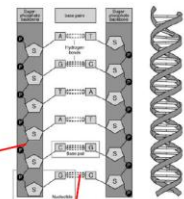


- There are four different kinds of bases so there are **four** different kinds of nucleotides:

- A = Adenine G = Guanine (these are **purines**)
- C = Cytosine T = Thymine (these are **pyrimidines**)

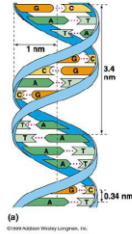


- The sugars and phosphate groups are on the outside of the molecule forming the "**sugar-phosphate backbone**". Each sugar is attached to the phosphate below by a "**covalent**" bond.



- The bases project into the middle and the base on one strand attaches to the base on the other strand by 2 or 3 "**hydrogen bonds**".

- Bases do not bond randomly.
- A bonds with T and C bonds with G (written as A-T and C-G).
- This is called "**complementary base pairing**" since the bases must fit properly together.

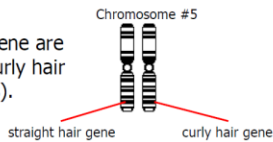
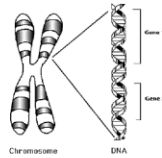


- The order of these bases along the DNA is what makes up the "**genetic code**", the instructions to make your eyes blue and your hair curly, etc.

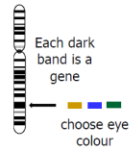
A	5
T	1
C	9
G	4
C	→ 5
C	2
A	2
A	6
T	2
T	0

- Any change in the order of these bases causes a "**genetic mutation**".

- A stretch of DNA with enough bases to code for one trait (ie. eye colour) is called a "**gene**".
- You have two copies of each gene, one on each homologous chromosome.
- Alternate forms of a gene are called "**Alleles**" (ie. curly hair vs. straight hair genes).



- Scientists know the location and function of many genes on the chromosomes ("**chromosome mapping**").



- It will eventually be possible to remove dysfunctional genes and insert healthy ones ("**gene therapy**").

- This could lead to "**designer babies**", choosing the genes for your baby.