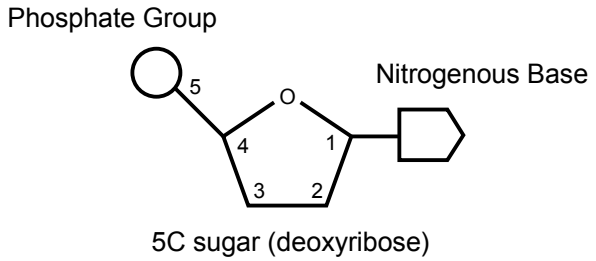
DNA Structure (3.3) & DNA Replication (3.4)

Outline DNA nucleotide structure (3.3.1)



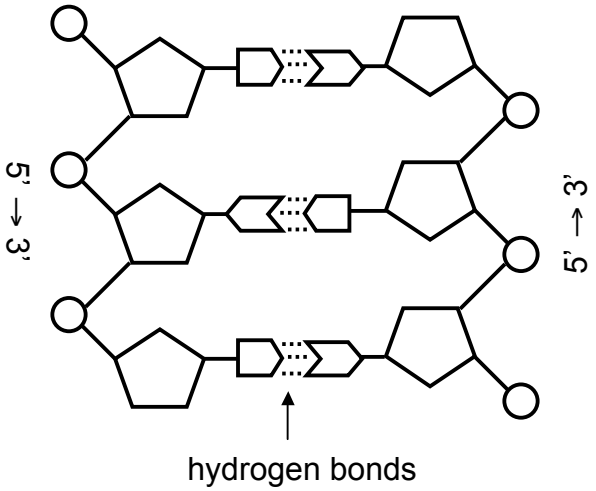
5C sugar (deoxyribose)

State the four bases (3.3.2)

- **A**denine
- **T**hymine
- **G**uanine
- **C**ytosine

Note: *RNA has **U**racil instead of **T**hymine*

Explain how DNA nucleotides form a double helix (3.3.3 / 3.3.4 / 3.3.5)



hydrogen bonds

Structural Arrangement:

- Nucleotides joined by a condensation reaction *(between 5'-phosphate & 3'-sugar)*
- This forms a sugar-phosphate backbone linked covalently *(phosphodiester bonds)*
- Two strands run anti-parallel with bases facing inwards *(5' → 3' versus 3' → 5')*
- Bases complementarily pair with hydrogen bonds *(A pairs with T ; G pairs with C)*
- This creates a double stranded structure that then twists to form a double helix

Explain DNA replication (3.4.1)

Helicase:

- Unwinds double helix and separates DNA strands by breaking hydrogen bonds between base pairs

DNA Polymerase:

- Synthesizes new strands complementary to template strands
- Nucleotides align opposite base partner (via H-bonding)
- DNA polymerase covalently joins the new strand

Explain the significant of complementary base pairing (3.4.2)

- Each organic base can only pair with its complementary partner (A = T ; G = C)
- A newly synthesized strand will therefore be complementary to its template strand
- The new strand will be identical to the opposite template strand
- The two double-stranded DNA molecules will be identical to each other

State how DNA replication occurs (3.4.3)

DNA replication is **semi-conservative** (one new strand ; one template strand)