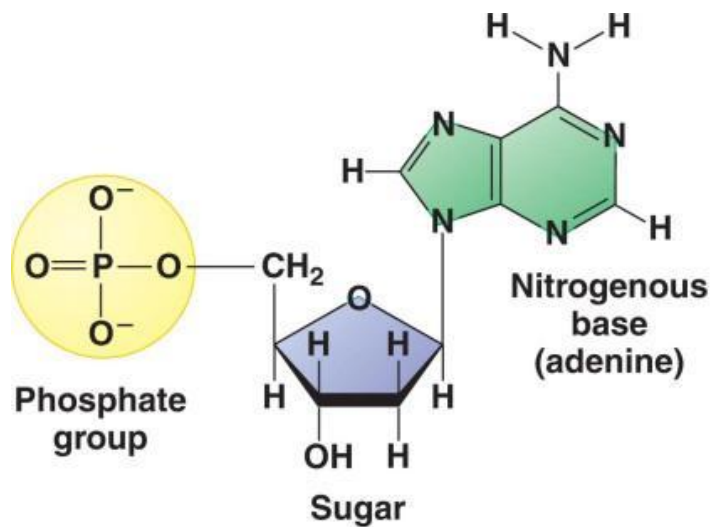


Year 12 HL

IB BIOLOGY

2.6 DNA and RNA



Name:

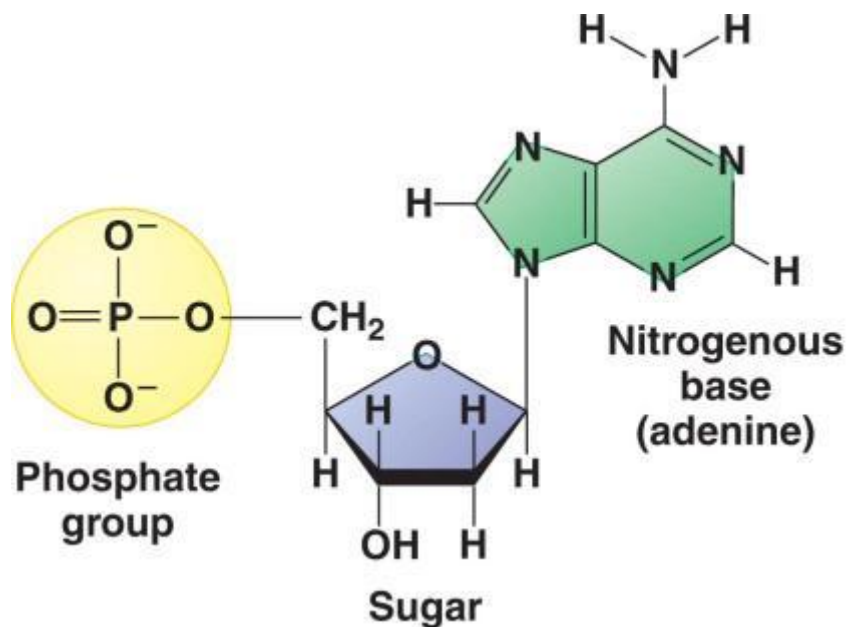
Teacher: Mr Trent

Understandings

- The nucleic acids DNA and RNA are polymers of nucleotides.
- DNA differs from RNA in the number of strands present, the base composition and the type of pentose.
- DNA is a double helix made of two antiparallel strands of nucleotides linked by hydrogen bonding between complementary base pairs.

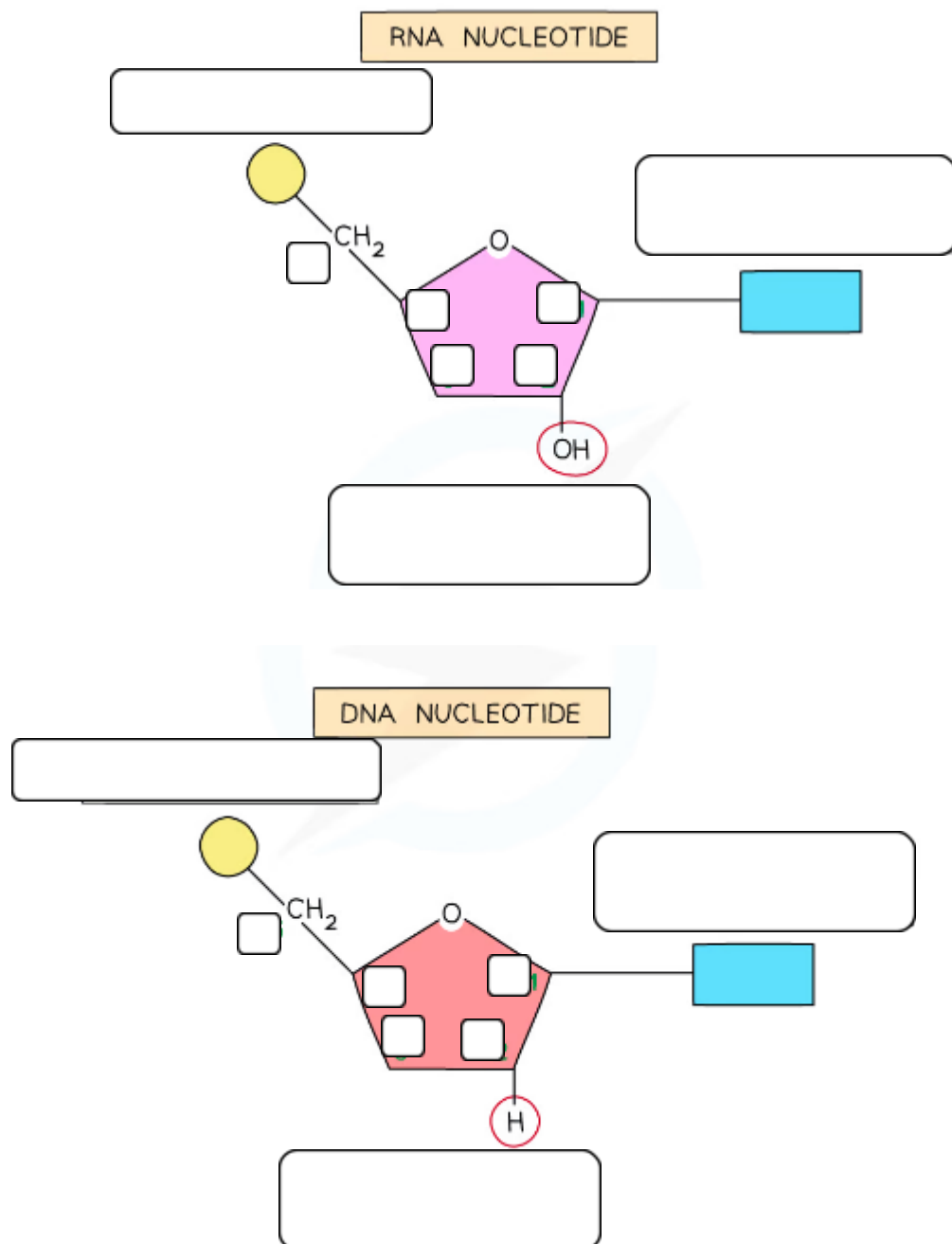
Applications and Skills

- **Application:** Crick and Watson's elucidation of the structure of DNA using model making.
- **Skill:** Drawing simple diagrams of the structure of single nucleotides of DNA and RNA, using circles, pentagons and rectangles to represent phosphates, pentoses and bases.



2.6.U1 The nucleic acids DNA and RNA are polymers of nucleotides.

- State the two types of nucleic acid.
- Outline the parts of a nucleotide.
- Identify and label carbons by number (for example, C1, C2, C3) on a nucleotide drawing.
- Explain how nucleotides can connect to form a nucleic acid polymer.



- State the names of the nitrogenous bases found in DNA and RNA.
- State the complementary base pairing rules.

Checkpoint:

1. Outline how the DNA nucleotides are linked together (you may choose to use a simplified diagram to respond).
2. Outline the rules involved with the pairing of the nitrogenous bases (how does complementary base pairing work?). What is Chargaff's ratio?
3. What sort of bonds is used to join the **nitrogenous bases** together?

2.6.U2 DNA differs from RNA in the number of strands present, the base composition and the type of pentose.

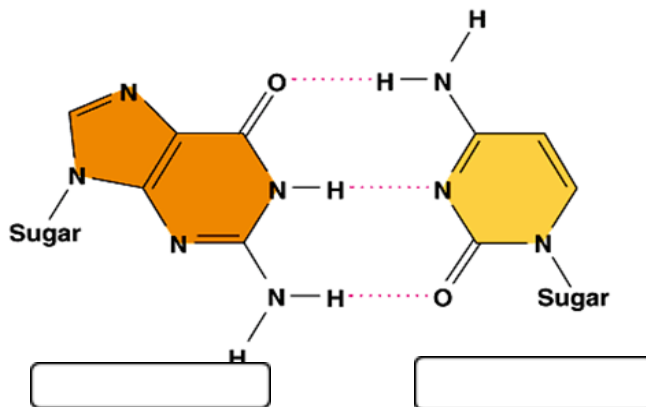
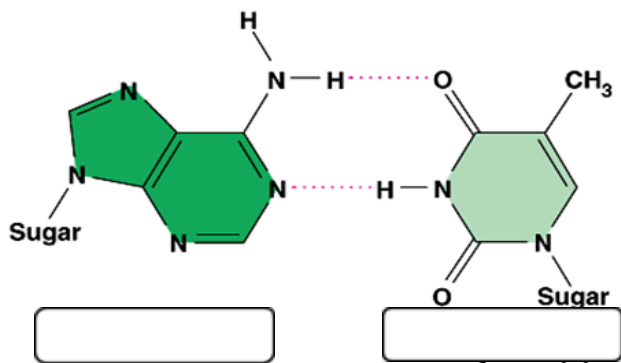
DNA and RNA

Complete the table comparing the structure of DNA and RNA:

DNA	RNA

2.6.U3 DNA is double helix made of two antiparallel strands of nucleotides linked by hydrogen bonding between complimentary base pairs.

- Define antiparallel in relation to DNA structure.
- Outline the formation of a DNA double helix by hydrogen bonding between nitrogenous bases.
- Identify the four bases of DNA based on the numbers of rings (purines or pyrimidines) and the number of hydrogen bonds it can form.
- State the number of nitrogenous bases per complete turn of the DNA double helix.



What is antiparallel and draw this below?

What is x-ray diffraction and crystallography?

Rosalind Franklin concluded:

- DNA exists as a long, thin molecule of _____
- The structure is highly _____
- DNA is _____

2.6.NOS Using models as representation of the real world- Crick and Watson used model making to discover the structure of DNA.

2.6.A1 Crick and Watson's elucidation of the structure of DNA using model making.

7.1.A1 Rosalind Franklin and Maurice Wilkins' investigation of DNA structures by X-ray diffraction.

Outline the role of Chargaff, Watson, Crick, Franklin and Wilkins in the discovery of DNA structure.

Explain how Watson and Crick used model building to determine the structure of DNA.

1. Which of the following are connected by hydrogen bonds?

- A. Hydrogen to oxygen within a molecule of water
- B. Phosphate to sugar in a DNA molecule
- C. Base to sugar in a DNA molecule
- D. Hydrogen to oxygen between two different molecules of water

(Total 1 mark)

2. The percentage of thymine in the DNA of an organism is approximately 30%. What is the percentage of guanine?

- A. 70%
- B. 30%
- C. 40%
- D. 20%

(Total 1 mark)

3. Which molecule is found in both DNA and RNA?

- A. Ribose
- B. Uracil
- C. Phosphate
- D. Amino acid

(Total 1 mark)

4. What are pyrimidines in DNA?

- A. Types of nucleotides
- B. Types of base pairs
- C. Types of sugars
- D. Types of bases

(Total 1 mark)

5. Draw a labelled diagram to show **four** DNA nucleotides, each with a different base, linked together in **two** strands.

(5)

1. D

2. D

3. C

4. D

5. Award [1] for each of these structures clearly drawn and labelled. four nucleotides shown in diagram with one nucleotide clearly labelled;
base, phosphate and deoxyribose (shown as pentagon) connected between the correct carbons
and labelled at least once;
backbone labelled as covalent bond between nucleotides correctly shown as 3' to 5' bond;
two base pairs linked by hydrogen bonds drawn as dotted lines and labelled;
two H bonds between A and T and three H bonds between C and G;
adenine to thymine and cytosine to guanine; do not accept initials of bases antiparallel orientation shown; [5]