

# RB3 - Nucleic Acids – Biology Revision

What is the biological function of DNA?

To **store genetic information**.

What is the biological function of RNA?

To carry and **transfer the genetic information** in DNA to the **ribosomes**.

What is the biological function of a ribosome?

To **build proteins**.

What are ribosomes made from?

Ribosomes are complexes of **RNA** and **proteins**.

DNA exists as a double helix structure. How does a molecule of RNA exist?

RNA molecules exist as a **short, single strand** of polynucleotide. They **fold and pair up with themselves**, unlike DNA.

Using your knowledge of base pairing, complete the following:

DNA Strand 1	A	A	G	T	C	C	C
DNA Strand 2	T	T	C	A	G	G	G

Now consider that DNA Strand 1 is bound to a strand of RNA. Complete the following:

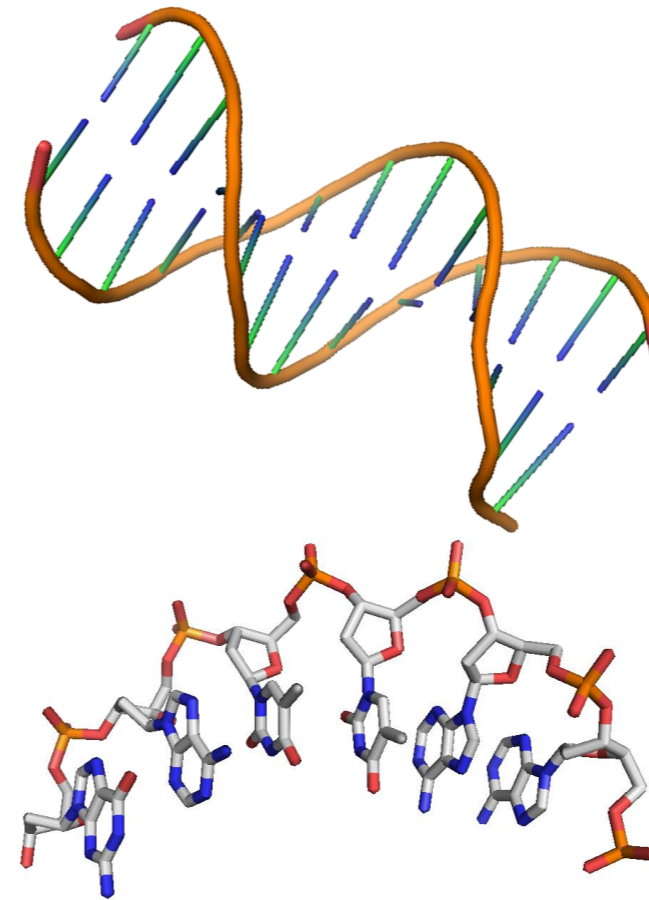
DNA Strand 1	A	A	G	T	C	C	C
RNA Strand 1	U	U	C	A	G	G	G

In another DNA strand, the percentage of adenine is known to be 17%. Use your knowledge of base pairing to calculate the frequency of each other base:

Base	%
Adenine	17%
Cytosine	<b>33%</b>
Guanine	<b>33%</b>
Thymine	<b>17%</b>

DNA and RNA are both types of nucleic acids. They are also known as polynucleotides. Explain why:

DNA and RNA are both made from a monomer subunit called a nucleotide. Polynucleotides are polymer chains of these nucleotide subunits.



DNA exists as a double helix structure. Explain why the two DNA strands involved are said to be complementary:

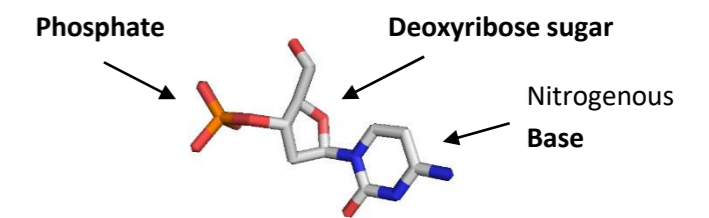
Because the **DNA bases on one strand match up to the DNA bases on another**. **Adenine will only bond to thymine**, and **cytosine will only bond to guanine**. For a DNA strand to bond to another, the **sequence of DNA bases must be exactly complementary**.

Which type of bonding joins the two DNA strands together?

How does this type of bonding arise in DNA?

**Hydrogen bonding** between the **base pairs** on each strand. Adenine bonds to thymine, and cytosine bonds to guanine.

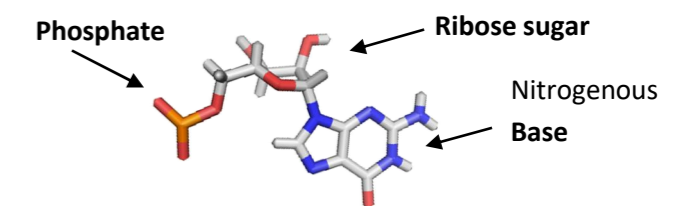
Label the three components of a DNA nucleotide:



Describe how a single strand of DNA can form from nucleotide units. State the type of bonding involved and explain how these bonds form:

**Covalent bonds** form between the **sugar** of one nucleotide and the **phosphate** of another. This occurs through **condensation** reactions, which **eliminate** a molecule of water each time. This process is repeated to form a **sugar-phosphate backbone**. These covalent bonds are known as **phosphodiester bonds**.

Label the three components of an RNA nucleotide:



How does the set of nitrogenous bases differ between DNA and RNA?

**DNA** uses the four bases: **adenine, cytosine, guanine, and thymine**.

**RNA** uses the four bases: **adenine, cytosine, guanine, and uracil**. **Thymine has been replaced by uracil**.

When RNA binds to DNA, which base pairs up with uracil?

**Adenine**

