

DNA replication

**What is DNA replication?**

DNA replication

**Why is DNA replication needed in multicellular organisms?**

DNA replication

**Semi-conservative replication**

DNA replication

**How does complementary base pairing make replication accurate?**

DNA replication

**Role of helicase**

DNA replication

**General role of DNA polymerase**

DNA replication

**The three PCR stages and temperatures**

DNA replication

**What are primers in PCR?**

For reproduction, and for growth and tissue replacement, since every new cell needs a full copy of the genome.

The production of exact copies of DNA with identical base sequences.

Each template base determines the base added (A-T, C-G), so the new strand's sequence is exactly complementary to the template.

Each new DNA molecule contains one strand from the original molecule and one newly synthesised strand.

Links free DNA nucleotides, paired to the template by complementary base pairing, into a new strand.

Unwinds the double helix and breaks hydrogen bonds between bases, separating the strands.

Short single-stranded DNA sequences that bind to the ends of the target sequence and give DNA polymerase a starting point.

Denaturation about 95 °C (strands separate); annealing about 55 °C (primers bind); extension about 72 °C (Taq polymerase builds new strands).

|                                                                                      |                                                                                                                  |
|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| <p>DNA replication</p> <p><b>Why is Taq polymerase used in PCR?</b></p>              | <p>DNA replication</p> <p><b>Basis of separation in gel electrophoresis</b></p>                                  |
| <p>DNA replication</p> <p><b>What does DNA profiling compare?</b></p>                | <p>DNA replication</p> <p><b>Why does using more markers improve DNA profiling?</b></p>                          |
| <p>DNA replication</p> <p><b>Paternity test rule</b></p>                             | <p>DNA replication <b>HL only</b></p> <p><b>To which end of a strand do DNA polymerases add nucleotides?</b></p> |
| <p>DNA replication <b>HL only</b></p> <p><b>Leading strand vs lagging strand</b></p> | <p>DNA replication <b>HL only</b></p> <p><b>Okazaki fragments</b></p>                                            |

Negatively charged DNA moves towards the positive electrode; smaller fragments move faster and travel further through the gel.

It is from the hot-spring bacterium *Thermus aquaticus*, so it is not denatured at 95 °C and works best at about 72 °C.

It reduces the probability of a false match between two different people, increasing reliability.

Lengths of short tandem repeat (STR) regions, amplified by PCR and separated by gel electrophoresis.

The 3' end: the 5' phosphate of the new nucleotide bonds to the 3' -OH, so strands grow 5' to 3'.

Every band in the child's profile must be present in either the mother's or the father's profile.

Short sections of DNA made discontinuously on the lagging strand, later joined by DNA ligase.

Leading: continuous, one RNA primer.  
Lagging: discontinuous, as Okazaki fragments, each needing a primer.

DNA replication **HL only**

**DNA primase and DNA polymerase III**

DNA replication **HL only**

**DNA polymerase I and DNA ligase**

DNA replication **HL only**

**DNA proofreading**

Polymerase I removes RNA primers and replaces them with DNA; ligase seals gaps in the sugar-phosphate backbone.

Primase makes RNA primers; DNA polymerase III adds DNA nucleotides to the primer's 3' end.

DNA polymerase III removes a nucleotide with a mismatched base from the 3' terminal and replaces it with a correctly matched one.