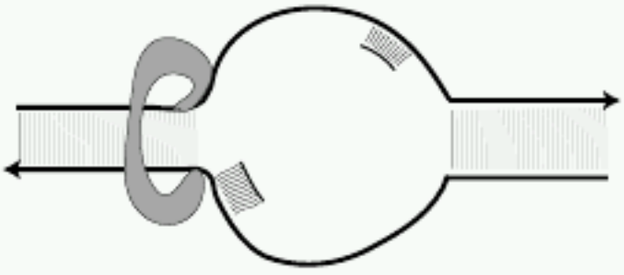
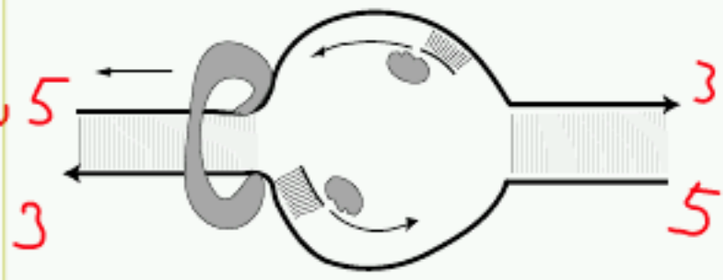
3. *Primers*, which are short single strands of RNA, are synthesized by a protein complex called *primase* and latch on to specific positions in the newly opened strands, providing an anchor for the next step. Without primers, the next step cannot begin.

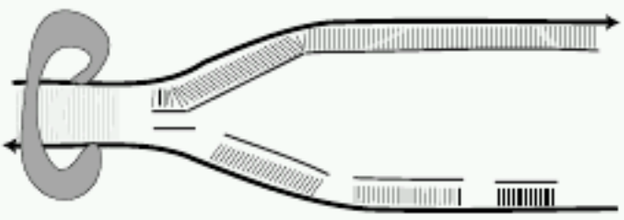


4. A *DNA polymerase* (yet another molecular machine) binds to each freshly separated *template* strand of the DNA; the DNA polymerase traverses the parent strands only in the $3' \rightarrow 5'$ direction. Therefore, the DNA polymerases attached to the two DNA strands move in opposite directions.



5. At each nucleotide, DNA polymerase matches the template strand's nucleotide with the complementary base, and adds it to the growing synthesized chain. Prior to moving to the next nucleotide, DNA polymerase checks to ensure that the correct base has been paired at the current position; if not, it removes the incorrect base and retries.

   Since DNA polymerase can only traverse DNA in the $3' \rightarrow 5'$ direction, and since the two strands of DNA run in opposite directions, only one strand of the template DNA can be used by polymerase to continuously synthesize its complement; the other strand requires occasional stopping and restarting. This results in short segments called *Okazaki fragments*.



6. Another molecular machine, *DNA ligase*, repairs the gaps in the newly synthesized DNA's backbone, effectively linking together all Okazaki fragments into a single molecule and cleaning any breaks in the primary strand.