The conformational change induced in the transmembrane receptors upon binding a ligand can activate a class of proteins known as the kinases. Tyrosine kinases are commonly found with transmembrane receptors. Once these kinases are activated, they phosphorylate other proteins by using ATP as an energy source. A phosphate group is removed from the ATP and attached to the target protein. Kinases cannot target any protein. The protein must have a specific amino acid (e.g. tyrosine in the case of tyrosine kinases) and a very specific set of amino acids surrounding that single amino acid. This is called the consensus sequence. In other words, kinases have incredible specificity.

Signals are how cells can respond to the extracellular environment or respond to signals from other cells. This process is critical in embryonic development as it leads to specialization of cells.

<u>DNA Replication</u>

DNA replication begins at a point on the DNA called the origin of replication site. DNA Helicase unwinds and separates a portion of DNA. Single-stranded binding proteins react with and stabilise this single-stranded portion of DNA.

The enzyme complex DNA polymerase engages the single strand and initiates the process of replication. Note that DNA polymerase can only add new DNA nucleotides to a pre-existing chain of nucleotides. Therefore, replication begins as the enzyme primase assembles an RNA primer at the start of replication site. This RNA primer is a short sequence of RNA nucleotides complementary to a small, initial section of the DNA strand being prepared for replication. DNA polymerase adds DNA nucleotides to the RNA primer. Later, the RNA primer is enzymatically removed and replaced with an appropriate sequence of DNA nucleotides by the enzyme nucleotide replacement enzyme.

DNA is bidirectional 5’ – 3’ and 3’ – 5’. DNA polymerase moves along the 3’ – 5’ direction, synthesizing a new 5’ – 3’ stand. It can only move in this direction. How is the 5’ – 3’ strand copied to make a new 3’ – 5’ strand? The answer is that the 5’ – 3’ strand is copied dis-continuously by means of Okazaki fragments. Each fragment requires a separate RNA primer. As these fragments are synthesized the RNA primers are removed by the nucleotide