**2010 Biology Indicators for Standard 5: Molecular Basis of Heredity**

5.1 DNA coils to form chromosomes; directed by proteins (histones). Chromosomes have a region called a centromere which holds sister chromatids together and telomeres at the tips of each sister chromatid. DNA is present as a double helix that is held together by hydrogen bonds. The building blocks of DNA are called nucleotides. Each nucleotide is composed of a nitrogen base (A,T,G,C), a sugar, and a phosphate group.

5.2 Genes are regions of DNA with a specific order of base pairs (nucleotides) that are responsible for inherited traits. Half of your genes come from each of your parents. Genes vary in length of base pairs.

5.3 DNA directs the production of proteins through the process of transcription and translation. First DNA, assisted by enzymes unzips and forms a complementary strand of mRNA. The strand will be edited to include only the information that is needed to form a specific protein. The mRNA containing triplets called codons, detaches from the DNA and leaves the nucleus of the cell. It then goes out into the cytoplasm of the cell where it attaches to a ribosome (rRNA). Transfer RNA (tRNA) then forms a complimentary strand of anticodons with the mRNA, carrying the correct amino acids into position so that they can form a polypeptide chain.

5.4 After proteins are released from the ribosomes, they fold themselves into different shapes which then have unique functions. Each amino acid has a specific molecular structure that causes it to bond to other amino acids in a polypeptide chain, creating the shape of the protein. Changing the order of amino acids changes the way bonding occurs which changes the shape of the protein, which alters its function.

5.5 Proteins can be structural (eye color, hair color, etc.), enzymes, or hormones.

5.6 Inherited traits include external features, influence mental ability and temperament, and direct metabolism. Some are observable macroscopically, others are not.

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| Standard numbers  In order taught | Activities |
| 5.1 | Relationship Of DNA To Chromosomes |
| 5.3 | Protein Synthesis |
| 5.2 | Genes Code For Polypeptides |
| 5.4 | Protein Structure and Function |
| 5.5 | Role of Proteins Within The Organism |
| 5.6 | Types of Traits |