1. **DNA (Deoxyribonucleic Acid)**:
   * DNA is a double-stranded, long-chain molecule that carries genetic instructions for the development, functioning, growth, and reproduction of all known living organisms and many viruses.
   * It consists of four types of nucleotide bases: adenine (A), cytosine (C), guanine (G), and thymine (T), which are arranged in a specific sequence.
   * DNA is located primarily in the cell nucleus in eukaryotic cells, where it forms structures called chromosomes. Prokaryotic cells, such as those of bacteria, also contain DNA but lack a true nucleus.
   * DNA replication occurs before cell division, ensuring that each daughter cell receives an identical copy of the genetic information.
2. **RNA (Ribonucleic Acid)**:
   * RNA is a single-stranded nucleic acid molecule that serves various roles in the cell, including carrying out instructions encoded in DNA.
   * Like DNA, RNA is composed of nucleotide units, but it contains ribose sugar instead of deoxyribose sugar and uracil (U) instead of thymine (T) as one of its bases.
   * RNA has multiple types, including messenger RNA (mRNA), transfer RNA (tRNA), and ribosomal RNA (rRNA), each with distinct functions.
3. **mRNA (Messenger RNA)**:
   * mRNA is a specific type of RNA that acts as a temporary copy of a gene's DNA sequence. It carries the genetic information from the DNA in the cell nucleus to the ribosomes in the cytoplasm, where proteins are synthesized.
   * The process by which mRNA is synthesized from DNA is called transcription. During transcription, RNA polymerase reads the DNA template and synthesizes a complementary mRNA strand using the appropriate base pairing rules (A with U, C with G).
   * mRNA carries the genetic code in the form of codons, which are sequences of three nucleotides that specify a particular amino acid. These codons are read by ribosomes during translation, the process of protein synthesis.
   * The sequence of nucleotides in mRNA determines the order of amino acids in a protein, making it a critical link between the genetic code in DNA and the actual proteins that perform various functions in the cell.

What is gene?Top of Form

A gene is a fundamental unit of heredity in living organisms, including humans. It is a segment of DNA (deoxyribonucleic acid) that contains the instructions or code for making a specific protein or set of proteins. Genes serve as templates for the synthesis of proteins, which are the workhorses of cells and perform a wide variety of functions in the body. Genes are responsible for determining an organism's traits, characteristics, and biological processes.

**Gene Expression**: Gene expression is the process by which information encoded in a gene is used to synthesize a functional protein or, in the case of non-coding genes, perform other regulatory functions. Gene expression is a tightly regulated and complex process that involves multiple steps.

Heredity refers to the passing of genetic information (traits, characteristics, and genetic material) from one generation to the next in living organisms, including humans.