Transcription – in which a copy of a gene’s base sequence is made, and (inside)

Translation – in which that copy is used to direct the production of a polypeptide. (outside)

Transcription. The information coded in DNA is copied into mRNA

* Transcription is the first step in the process of producing proteins base on instructions contained in DNA
* In transcription (which occurs in the nucleus in eukaryotic cells), a single copy of one specific gene in the DNA is made, in the form of a molecule of mRNA.
* When mRNA copy of a gene is completed, it moves to the cytoplasm, where it can be translated into a polypeptide.
* Translation
  + In translation, the mRNA copy of the information from the DNA is used to build functional molecules.
  + Translation is the 2nd step in the two-step process by which information carried in the DNA directs the synthesis of proteins.
  + In translation, the information from a gene that has been encoded in the nucleotide sequence of an mRNA is read, and ingredients present in the cell’s cytoplasm are used to produce a protein.
* Genes are regulated in several ways
  + Environmental signals influence the turning on and off of genes
  + By binding to DNA, regulatory proteins can block or facilitate the binding of RNA polymerase and subsequent transcription of genes.
  + *Regulation* of a gene expression also can occur in a variety of other ways that enhance or impede transcription, or alter mRNA’s longevity and rate of degradation, or influence translation or protein processing.
* Mutations are alterations in a single base or changes in large segments of DNA that include several genes or more.
* They are rare, but when they do occur, they may disrupt normal functioning of the body (although many mutations are neutral).
* Although extremely rarely, mutations may have a beneficial effect.
* Does sunscreen use reduce skin cancer risk?
  + Numerous case-controlled studies suggested that sunscreen use increase the incidence of melanoma, the most deadly type of skin cancer.
  + But a more powerful randomized controlled approached demonstrated that regular sunscreen use significantly reduces the risk of melanoma.
* Biotechnology is the use of technology to modify organisms, cells, and their molecules to achieve practical benefits.
* Modern molecular methods made it possible to cut and copy DNA from one organism and deliver it into another.
* The methods include using naturally occurring restriction enzymes to cut DNA, the polymerase chain reaction to amplify small amounts of DNA, insertion of the DNA into bacterial or viral resources.

DNA is double stranded

RNA is single stranded