

## GENE ORGANIZATION AND CHROMOSOME STRUCTURE

- The human genome is organized into chromosomes, which consist of chromatin (made of DNA and protein)
- Each chromosome consists of an unbroken double-stranded DNA helix
- every 200 nucleotides are coiled around eight stabilizing proteins called histones
- This complex of DNA wrapped around histones is called a nucleosome
- These fibres fold into the final chromatin structure by a higher level of coiling, called supercoiling
- there are 46 chromosomes where 44 are somatic and 2 are sex chromosomes.
- They vary in size and are numbered from 1 to 22 according to size with the largest being #1.
- 95 % of the human genome is noncoding.
- Noncoding regions are filled with variable number tandem repeats (VNTRs), also known as microsatellites, which are sequences of base pairs that repeat and vary among individuals
- The length and position of microsatellites varies between individuals
- Some microsatellites are associated but some (like telomeres) are beneficial
- Telomeres are repetitive noncoding DNA at the end of the chromosomes.
- Every time DNA replicates, base pairs on the ends of the chromosomes are lost, and telomeres prevent the coding DNA from being damaged
- Centromeres also contain repetitive noncoding DNA and are important for cell division.
- Pseudogenes are similar in sequence to a functioning gene but do not make RNA or proteins.
- There are two types: LINEs (long interspersed nuclear elements) and SINEs (short interspersed nuclear elements)

### **Seatwork**

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