

# Biology 3.3 dna structure

[Science](#), [Genetics](#)



3. 3 & 7. 1 DNA Structure Worksheet 1. Draw and label the structure of a simplified single nucleotide, including sugar, phosphate and base. 2.

Complete the table below to show the pairings of the bases in DNA: Purine| Pyrimidine| Adenine| Thymine| Guanine| Cytosine| 3. Where would one find the base uracil? RNA, it replaces thymine 4. In the space below, draw a single strand of three nucleotides, naming the bonds between them and showing the correct relative position of these bonds. The sequence of these bases makes up the genetic code. The red lines represent covalent bonds.

They are read in groups of three called triplets. These triplets are then used to send instructions in the cell: to switch genes on and off. 5. Define the term double helix. The term double helix is two strands of DNA that twist around each other. Anti-Parallel 6. In the space below, draw a section of DNA, showing two anti-parallel strands of three nucleotides. Label the bonds which hold the bases together as well as the correct complementary base pairs. Also include the 3' and 5' linkages (and ends), and the distinction between purines and pyrimidines. . Explain the relevance of the following in the double-helix structure of DNA: a. Complementary base pairing Complementary base pairing is when G only bonds with C and T only bonds with A and these are found on each strand of the double helix b. Hydrogen bonds Hydrogen bonds between the bases hold together the strands of DNA c. Relative positioning of the sugar-phosphate backbone and the bases The relative positioning of the sugar-phosphate backbone are on the outside and the bases are on the inside of the double helix 8.

In the space below, draw the structure of a simplified nucleosome, including the H1 linker and histone proteins. 9. Nucleosomes allow the DNA to be

supercoiled. a. What is the approximate length of the DNA strand in one chromosome? The length is (length of 1 bp) (number of bp per cell) which is 2 meters. b. During which phase of the cell cycle is DNA most likely to be supercoiled? Prophase c. Outline how nucleosomes help regulate transcription. 10. Distinguish between unique or single-copy genes and highly repetitive sequences: Single-copy genes | Highly-repetitive sequences | . 5% of genome makes polypeptides. Each codon (mRNA) (3 bases) codes for one amino acid. 3% codes for 'on/off' gene switches. Within each eukaryotic genes there are: Exons (coding regions) | Introns (non-coding regions which are edited out) Every gene has a 'switch', for example a skin cell will turn off unnecessary genes so it does not perform the wrong activity (e. g. producing blood) | Makes up about 5% - 45% of the genome. Once called junk DNA | Also known as satellite DNA, each repeated sequence can be 5-300 base pairs | HRSs are used in genetic fingerprinting.

This is because they accumulate mutations rapidly | Not all of the base sequences in DNA are translated. Highly repetitive base sequences are not translated. They consist of sequences of between 5 and 300 bases that may be repeated up to 10 000 times. They constitute 5-45% of eukaryotic DNA. Single-copy genes or unique genes are translated and constitute a surprisingly small proportion of eukaryotic DNA. 11. Distinguish between introns and exons in eukaryotic genes. Exons (coding regions) | Introns (non-coding regions which are edited out)