

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:

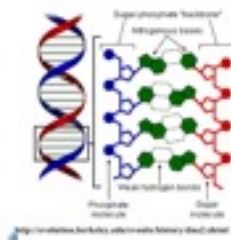
Purine	Pyrimidine

3. Where would one find the base *uracil*?
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.

5. Define the term *double helix*.



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.
7. Explain the relevance of the following in the double-helix structure of DNA:
- Complementary base pairing
 - Hydrogen bonds
 - Relative positioning of the sugar-phosphate backbone and the bases



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*.
- What is the approximate length of the DNA strand in one chromosome?
 - During which phase of the cell cycle is DNA most likely to be supercoiled?
 - Outline how nucleosomes help regulate *transcription*.
10. Distinguish between *unique or single-copy* genes and *highly repetitive sequences*:

Single-copy genes	Highly-repetitive sequences

11. Distinguish between *introns* and *exons* in eukaryotic genes.



12. The discovery of the structure of DNA earned a Nobel Prize for Watson, Crick and Wilson.

Read the resources at the Nobel Prize website: http://nobelprize.org/educational_games/medicine/dna_double_helix/readmore.html

How is it a good example of the following:

a. *Internationalism* in science?

b. *Cooperation* in science?

c. *Competition* in science?

13. What was the role of Rosalind Franklin in the process of the discovery of the structure of DNA and why was she not included in the Nobel Prize?

